Relation between concentration and profitability in some UK construction markets

By

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ABSTRACT

This report focuses on empirical study in order to find a relationship between concentration and profitability in some construction market. The data are obtained from FAME data base and Department of Trade and Industry (DBERR). In order to calculate concentration ratio, MA formula has been used. In profitability part, the ratios of gross profit over total assets, operating profit over total assets less current liabilities, operating profit over turnover are used.

Two hypotheses have been set up to test. The hypotheses are: Higher concentration ratio of markets result in higher average profit margin and/or Return on Capital Employed (ROCE) of firms supplying that market, as well as relative profitability of any firm of trade A compare to trade B will change over time in the same direction as change in the relative concentration ratios of A and B.

The outcome of the report is that there is weak relationship between concentration ratio and profitability in some construction industry. Moreover, there is no indication that relative profitability alters through time regardless of manner in which relative concentration ratio changes through time. Future works can be directed towards finding the reason of high volatility in concentration ratio of specialist trades as well as closer look to sub-markets.

Key words:
Concentration ratio, Profitability, Market structure, Specialist trades, MA formula

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1. Introduction

This thesis provides an empirical study in the concentration-profitability relation. This relation has been examined as if construction sub-markets were oligopolistic. Two sets of hypotheses have been examined. The concentration ratio has been measured exploiting McCloughan and Abounoori (MA) formula and on profitability side Return on Capital Employed (ROCE) and profit margin have been used. The data have been gathered from reliable sources such as Department of Trade and Industry (DBERR) and FAME database. The author has constructed the concentration ratio and only the necessary information on profitability has been derived by analysis from the FAME database.

1.1 Industry overview

According to Department of Trade and Industry (DTI), the UK construction sector is responsible for about 10% of Gross Domestic Product (GDP). British construction sector is dynamic and consists of many diverse markets in terms of their levels and developments in concentration. In competitive analysis, concentration is a key component of the market structure. Comprehensive data is available on British construction from (DETR)/DTI which has changed its name to the Department for Business, Enterprise and Regulatory Reform (DBERR). The third section of the publication with the title of Housing and Construction Statistics Annuals/Construction Statistics Annual has been used. The author studied the relationship between profit and the market concentration of firms, against the common view that construction sector is perfectly competitive. They based upon the fact that subcontracting and market fragmentation is prevalent in the sector (Ive and Gruneberg, 2000). Therefore, the topic of this report is: *Relationship between concentration and profitability in some UK construction market.*

1.2 Hypotheses

The hypotheses are:

- Higher concentration ratio of markets result in higher average profit margin and/or Return on Capital Employed (ROCE) of firms supplying that market

- Relative profitability of any firm of trade A compare to trade B will change over time in the same direction as change in the relative concentration ratios of A and B

1.3 Definitions

There are terms which will be used throughout this thesis which have been defined here:

- Trade: according to DBERR construction trade corresponds to the market of a type of subcontractor
- Oligopoly: small number of companies control a significant share of the production of a particular good or provision of services within a market
- Profitability: return on capital or net asset investment
- Concentration ratio: cumulative share of the four or five or n largest firms in the market
- Buyer concentration: measures share of product purchased by few buyers
- Seller concentration (market or industry concentration): measures share of good produced by few firms in market or industry
- Value added: Difference between the total sales revenue of an industry or firm and the total cost of components, materials, and services purchased from other firms or industries
- Gross Domestic Product: is a measure of the total economic activity occurring in the UK which can be measured by production, income or expenditure.
- Collusion: when oligopolistic firm agree on a strategy to increase the price which leads to supernormal profits

- Economies of scale: efficiency associated with supply side changes such as cost advantage due to firm's expansion
- Economies of scope: where it is cheaper to combine two or more product lines in one firm, rather than producing them separately
- Price-cost margin: difference between price and marginal cost as price fraction

1.4 Structure- Conduct-Performance paradigm

Structure-Conduct-Performance (SCP) paradigm provides a frame work for descriptive and non-analytic field. Figure 1 shows the structure of the concept. Similar to other economic theories, supply and demand is shown as basic condition in this concept. Factors such as raw materials and technology are included in supply side whereas factors such as price elasticity and rate of market growth are at demand side (Martin, 2002).

Basic condition leads to market structure. Number of sellers and buyers, product differentiation and barriers to entry are features in market structure. Market structure is expected to have an immense influence on profitability. It is worth exploring the relationship between one of the features in the market structure and profitability. Therefore, possible relationship between seller concentration and profitability is explored. Profitability may have a continuously positive relation with seller concentration or rather there maybe a rise in profitability at a critical level seller concentration. As a result, it can be assumed that there is positive relationship between seller concentration and profitability (Devine et al, 1985).

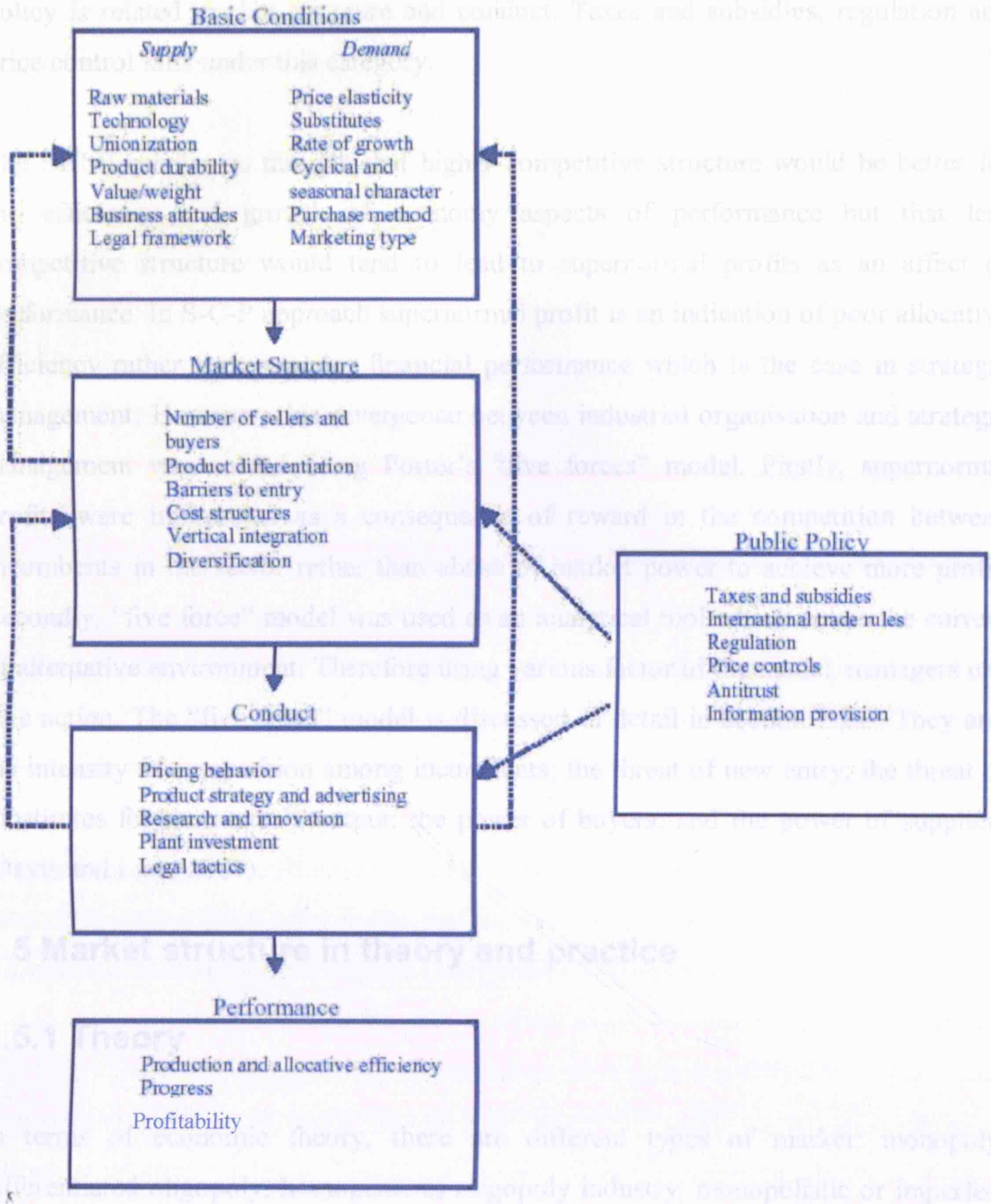


Figure 1.1: The structure-conduct-performance adapted from Martin (2002)

Market structure leads to conduct. Conduct covers factors such as research and innovation, advertising and product strategy as well as pricing behaviour. Delorme et al (2002) argue that advertisement create future barrier of entry and is best regarded as a forward-looking strategy. Market performance is the next stop. Productive and allocative efficiency and profitability are example from this category. Performance depends on structure alone since conduct is seen uniquely related to structure. Public

policy is related market structure and conduct. Taxes and subsidies, regulation and price control falls under this category.

The S-C-P economies thought that highly competitive structure would be better for the efficiency and growth of economy aspects of performance but that less competitive structure would tend to lead to supernormal profits as an affect of performance. In S-C-P approach supernormal profit is an indication of poor allocative efficiency rather than superior financial performance which is the case in strategic management. However, this divergence between industrial organisation and strategic management was solved using Porter's "five forces" model. Firstly, supernormal profits were interpreted as a consequence of reward in the competition between incumbents in the sector rather than abuse of market power to achieve more profit. Secondly, "five force" model was used as an analytical tool which assess the current of alternative environment. Therefore using various factor of the model, managers can take action. The "five force" model is discussed in detail in section 2.2.3. They are: the intensity of competition among incumbents; the threat of new entry; the threat of substitutes for the sector's output; the power of buyers; and the power of suppliers (Davis and Lam, 2001).

1.5 Market structure in theory and practice

1.5.1 Theory

In terms of economic theory, there are different types of market: monopoly, differentiated oligopoly, homogeneous oligopoly industry, monopolistic or imperfect competition and perfect competition. In the differentiated oligopoly economies of scale, concentration and differentiation are relatively high. As a result the level of profitability in this kind of market is high. The difference between differentiated and homogeneous oligopoly market of course, lies in product differentiation. There is no product differentiation in the latter market which reduces the profitability in compare to first market. Monopoly competition has relatively highest profitability since almost all the market is controlled by incumbent firm. However, in perfect competition all those three aspects of market structures that influence the level of profitability are low

so the situation is equal for all firms in order to compete over market share and profitability (Hay and Morris, 1991).

Construction market can be either monopolistic or imperfect competition or differentiated regional oligopoly market. There is product differentiation in the market and that is why the third type of market which mentioned above has been eliminated in case of construction market. If only by location construction products are intrinsically differentiated and different firms with different location have differential access to localised set s of demands. There is no homogeneous commodity product of construction. Firms also differ in the functions, sizes, designs and technologies of the construction product they produce. Product differentiation is the similarity between differentiated oligopoly and imperfect competition. However, in differentiated oligopoly there are barriers to entry and small numbers of firms. However, high level of competition results in normal profits whereas limited competition results in supernormal profit. Of course, market power increases and subsequently the potential of collusion increases.

At regional level, construction market can behave as oligopoly or imperfect competitive way. This is due to the fact that construction is a local market taking to consideration the expensive transport. In general firms can not survive in this market if there are not fully present in the area in which a task is being completed. Moreover in relatively big contracts, only limited numbers of firms are qualified to tender which may result in high profitability. However, in the present study, construction market is evaluated at national level. Moreover, as it will be discussed in the next chapter national concentration ratio of the top 100 firms are around 60%. According to oligopoly definition, concentration ratio of the top four firms should be 40%.

High concentration ratio in the market means there are barriers for entry. The dominant factors are initial capital and sunk costs. Higher concentration is expected in those specialist trades where scale is important and capital/plant is used more intensely. It is expected that high concentration ratio result in high profitability.

Firms try to keep their market share. However the reactions of firms are different when a firm reduce or increase its price or output in oligopoly market. This model is

called kinked demand curve. Raising prices by a firm will result in losing market share and subsequently total revenue. Demand is relatively elastic. In case of reducing price, gain in market share is limited and total revenue decreases because other firms follow suit. Demand is relatively inelastic.

In equilibrium Marginal Revenue (MR) = Marginal Cost (MC) for profit maximizing firm under any market form. However, in equilibrium of oligopoly firm, MC may not be equal to MR. Often there is a considerable range of profitability at that level of output. Excess or economic profit is possible in the long run if the price is between competitive and monopolistic price. Demand is relatively inelastic in this situation. There are large barrier to entry or exit oligopoly market. In oligopoly, each firm engages in strategic decision making which is taking explicit account of a rival's expected response to its decision.

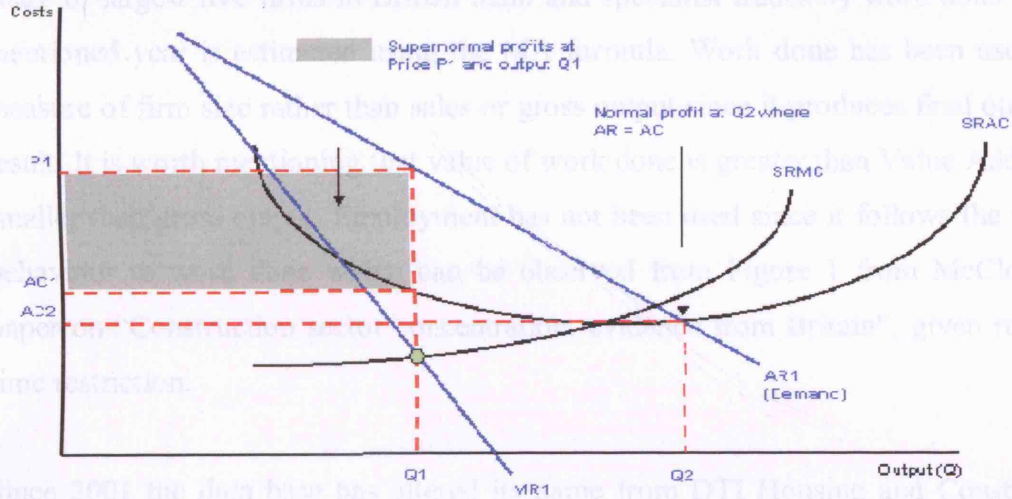


Figure 1.2: Maximizing oligopoly profits (tutor2u.net)

1.5.2 Practice

The relationship between market concentration and profitability has attracted attention for some time now. The early work was by Bain (1950). He believed higher concentration in a market result in high profit margin. His studies indicated positive relationship between concentration and profitability. The hypothesis has been proven true by various studies. Following Bain many empirical studies of concentration have been done using n-firm (commonly 5 firms) concentration ratio, in fact because this

data was available for SIC manufacturing industry from the census of production. However similar data is not available for construction SIC.

Patrick McCloughan and Esmaiel Abounoori have come up with MA formula in order to calculate concentration ratio for firms which are grouped into size classes including relevant number and aggregate size. In order to exploit MA, two bids of information are required. First the number of firms in each category, and second its proportion towards total market size. This data is available from DBERR construction census which is published as chapter three of Construction Statistic Annual. McCloughan used MA formula data for the period 1971-2000 and analysed main trades as well as special trades in interval of five years starting from 1980.

The present study collected data from 2001-6, thus updating McCloughan study. The share of largest five firms in British main and specialist trades by work done for the mentioned year is estimated using the MA formula. Work done has been used as a measure of firm size rather than sales or gross output since it produces final output or result. It is worth mentioning that value of work done is greater than Value Added but smaller than gross output. Employment has not been used since it follows the similar behaviour to work done which can be observed from Figure 1 from McCloughan paper on "Construction sector concentration: evidence from Britain", given research time restriction.

Since 2001 the data base has altered its name from DTI Housing and Construction Statistics annual to Construction Statistics. Other changes have been in categorising main and specialist trade. For example in main trade names such as Building & civil engineering contractors and General builders changed to House building and Non-housing building. There are two more division to main trade: Civil engineering and all trades.

These changes are drastic in specialist trades. There were 19 trades in the previous publication. However, 13 specialist trades exist in the current publication. There are some specialist trades that do not exist in the tables any more or divided into various specialists or their name has been changed. An example is the breaking up construction engineering into construction of highway and waterway in the new

edition. Examples of elimination of specialists are asphalt and tar spray, suspended ceiling specialists, heating and ventilating engineers and reinforced concrete specialists.

In profitability part, the ratios of gross profit over total assets, operating profit over total assets less current liabilities, operating profit over turnover are used. The information is obtained from FAME database. It is worth mentioning that the businesses have been grouped using Standard Industrial Classification (SIC), with three digit that covers a main industry in construction sector and four digit which covers specialised group or sub industry activities.

The structure of the paper is as follows. The next chapter briefly reviews early researches relating to relationship between concentration and profitability. In the following chapter, more detail is provided regarding the nature of MA formula. Afterwards, MA is put to use with relation to profit margin and Return on Capital Employed (ROCE) and the obtained data are analysed for 2001-2006. A comparison between obtained result from MA method and other methods regarding concentration ratio calculation will be done and discussed. Final chapter, concludes, highlights the relationship between variables and suggest some avenues for future research.

2. Literature Review

This chapter investigates the background literature on concentration-profitability as well as market structure generally and its relation to profitability.

2.1 Early works

Hall and Tideman believe that concentration index should be one dimensional, independent of size of industry (Hay and Morris, 1991). Hannah and Kay indicated that if a concentration curve completely lies above another, it represents a higher level of concentration. The axes of the graph: at x-axis, number of firms from largest to smallest and cumulative percentage of market output at y-axis. It can be noticed in figure 4 that concentration ratio of A is higher than concentration ratio of B. Concentration ration of C is the smallest. They believe that mergers of firms increase concentration Moreover, new entry results in lower concentration ratio. However, if the average size of new entrant is big enough, it can raise the curve vertically (Martin 2002).

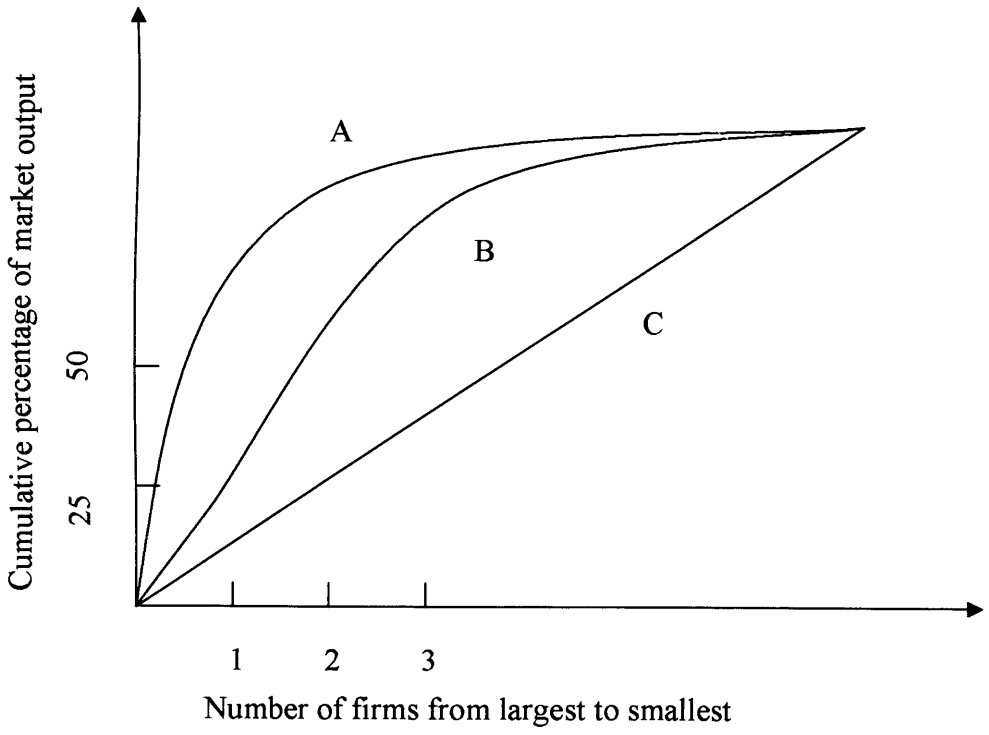


Figure 2.1: concentration curves

Bain has done the earliest work on concentration-profitability. He used concentration ratio of eight firms in the United States manufacturing industry to discover positive relationship between concentration and profit, confirmed by various studies. Nevertheless, there were some criticisms of Bain's studies. Brozen (1971) criticised him on three bases. First, periods of his sample were disequilibrium. Secondly, he was biased toward selection of an industry and finally, use of large firm profit rates led to a biased measure of profitability.

John Sutton (1991, 1998) divides industry into: high alpha and low alpha. Alpha depends to extent of which innovation can result in product cost advantage or product differentiation. Therefore industries with high alpha gain more profit and high sale by higher expenditure on Research and Development (R&D) than rival firms. On the other hands, low alpha industries do not achieve significantly by expenditure on R&D. Construction industry has low alpha. With high ratio of R&D to sale, minimal bound on seller concentration raises consistently, the more homogeneous the sub-market in the specified industry. Thus, in construction, specified concentration ratios are relatively low.

2.2 Market structure

Market structure describes the market regarding competition and market share. The most competition can be found in perfect competition and competition reduces with imperfect competition towards oligopoly. The least competition market is pure monopoly when there is only one seller and many buyers.

2.2.1 Construction Market

The neo-classical model of firm has been used in construction market. This model is based on three sets of assumptions concerning the aim of the firm, supply and demand law and the cost. Neo-classical approach does not describe what happens, it provides a general approach to competitive and oligopoly markets. The implications for choosing

this model over other models are twofold. First, the firm can have objective and take decision. It is considered as an entity. Secondly, firms seek for best possible performance rather than feasible routines.

The aim of the firm is assumed to be profit maximization. This can be divided into short run and long run. In case of cost, it is assumed that cost is certain for standard production. In short run, cost curve is U-shaped. Last but not least, it is assumed that the relationship between demand and supply is inversely proportional. It indicates with increase in price, quality supplied rises while demand falls.

2.2.2 Market dimensions

There are three basic dimensions of market structure: seller concentration, buyer concentration, and entry barriers.

Seller concentration

Seller concentration can be measured by concentration ratio which is absolute concentration. However, concentration ratio can record level of seller concentration at only one point on the cumulative concentration curve. Therefore in order to compare level of concentration, same point should be recorded which is challenging. In order to solve the problem, an index should be used that take into consideration share of all firms in the market. This is called *Herfindhal* index which is calculated by squaring and summing the share of the market size accounted for by every firm producing in the market. MA formula has done a similar task by including all firms which affect the market in calculation.

Gruneberg and Ive (2000) argue that in construction market, the key issue is number of competitors rather than seller concentration. This is due to the fact that construction is believed to be a fragmented sector. The competition differs given that factors such as project size, project technology and location influence the market. Therefore there are always limited numbers of firms in the market for specific tasks.

Buyer concentration

There is a lack of data in classifying the total purchases of each type of product by purchasing firm. Guth et al (1963) argue that buyer concentration is substantially lower than level of seller concentration. He indicates there are various patterns of buyer concentration across industry. The relationship between degree of buyer concentration and profitability is negative (Taisei et al, 2005). Therefore, it is expected that sellers of new housing many buyers have more profitability than large contactors producing large capital projects.

Buyer concentration can result in buyer power in the specific market. This situation only occurs when there are many sellers and a few buyers. This, in turn, results in high bargaining power of buyers which results in profit reduction in firms. However, in construction market, buyer concentration can be high given type of tasks required.

Barrier to entry

Barrier to entry prevents firms from entering the market. It has a significant influence on profitability. Scherer and Ross (1970) have described the main approach to measure entry barrier: study the area surrounding particular market and factors which are going to influence the market followed by judgments such as high, moderate to low. There are four main obstacles: legal, buyer loyalty, absolute cost advantage and economies of scale.

Barriers to entry play a key role in the market, both in long run where innovation is an issue and short run where emphasis is on prices and margins. Barriers to entry can exist in various terms such as economies of scale, supply chain, incumbents' cost advantage, private information, client imposed barriers to entry to contract construction market.

Under economies of scale, there are two sides: costs and access to potential customers. Certainly, new entrant has to incur minimum cost to be competitive. Another issue is customer loyalty. This can be resolved to some extent with advertising and expenditure on quality management. At supply chain part, firms can integrate

vertically which makes it even more challenging for new entry since new firms have to spend more to either have a contract with them or establish their own resources centre. Incumbent firms have cost advantage over new entrant firms. Incumbent firms are already established in the market with necessary equipment sunk costs and it is relatively easier for them to deal with customers demand wise. Another large barrier is market and technical knowledge. Private information regarding environment surrounding the market can be vital in order to enter a competition. Client may impose some conditions on projects so that only limited firms can participate. Finally, existing firms may change their behaviour in order to prevent new entry. This can occur as a form of lower price or higher output compared to normal condition.

2.2.3 Porter five forces

In order to discuss market environment and further understanding of competitive strategy which leads to market concentration and higher profitability, Porter's five forces are explained here.

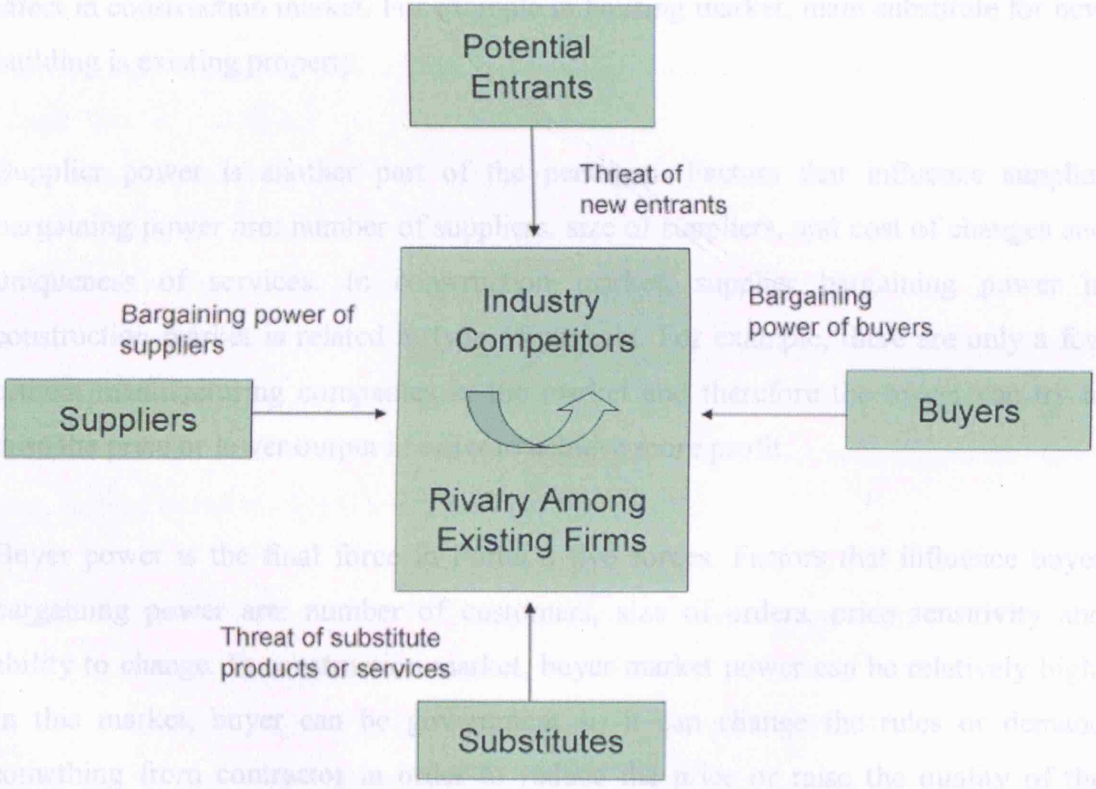


Figure 2.2: Forces driving industry competition (Porter's five forces) adapted from Porter (1980)

All competition forces determine the intensity of industry competition and profitability. With different strategic decision, various forces are more crucial in the process. This topic itself is quite vast, however in this report only the factors influence the forces are indicated and construction market with regard to these five forces will be explained.

Rivalry among existing firms in the market can be affected by factors such as: number of competitors, level of economic growth, storage cost, switching cost, diverse competition, high strategic stakes, and exit and entry barriers. In construction market, the rivalry between existing firms is moderate and high. In the previous section, barrier to entry was discussed. In construction market, barrier to entry depends to type of projects. For example, some projects required special equipment or skills which make it challenging for new firms to enter that market. However, some projects require no speciality and low budget makes it easier for new firms to participate.

Another force is pressure from suppliers of substitute products. This force has a low effect in construction market. For example in housing market, main substitute for new building is existing property.

Supplier power is another part of the pentagon. Factors that influence supplier bargaining power are: number of suppliers, size of suppliers, and cost of changes and uniqueness of services. In construction market, supplier bargaining power in construction market is related to type of projects. For example, there are only a few cement manufacturing companies in the market and therefore the owner can try to raise the price or lower output in order to achieve more profit.

Buyer power is the final force in Porter's five forces. Factors that influence buyer bargaining power are: number of customers, size of orders, price sensitivity and ability to change. In construction market, buyer market power can be relatively high. In this market, buyer can be government so it can change the rules or demand something from contractor in order to reduce the price or raise the quality of the project which subsequently results in reduction in profitability.

2.2.4 Market aspects

There are four aspects of market structure in oligopoly to investigate and relate to profitability (Hay and Morris, 1991):

1. product differentiation
2. external competition from new entry
3. collusion
4. non-collusive (Nash-Cournot)

High level of product differentiation can result in considerable profit. However, high level of product differentiation may reflect intense non-price competition and therefore low profitability. As mentioned earlier, there is some product differentiation in construction market but low level of expenditure to create such differentiation (advertising; R & D). Product differentiation can lead to brand loyalty which can increase profitability. As of external competition, profit depends on the cost structure and level of profit that is achieved by incumbent firms. Barriers to new entry are a vast subject that author will explain further in detail in the following section. The possibility of collusion is relatively strong in oligopoly situation taking to consideration that relatively a few number of firms dominating the market. Prices are set in such a way that either supernormal profit can be achieved or a large entry barrier can be formed to prevent any new entry to the market. Last but not least, non-collusive competition is at centre of attentions. It is argued that industry with relatively higher concentration attain relatively higher profitability. In non-collusive equilibrium firms do what they think is best for the firm considering other firms performance in the market (Casson and Creedy, 1993).

Figure 6 demonstrates the link between market structure and profitability. It can be observed that product differentiation influences both barriers to entry as well as collusion which result in high profit rate and profit- cost margin. This figure shows that industry with high degree of concentration tend to co-operate with each other which result in super normal profit. This is very typical in the business world with the famous example of British Airways and Virgin Atlantic fixing ticket prices. The

outcome was that BA fined staggering amount where as Virgin reporting the cartel was clear of any wrongdoing. Concentration affects profitability directly through Nash-Cournot behaviour and collusion as well as indirectly through its impact on advertisement and Research and Development (R&D) product differentiation. There is no linear relation between profitability and concentration. However, higher concentration results in higher profit.

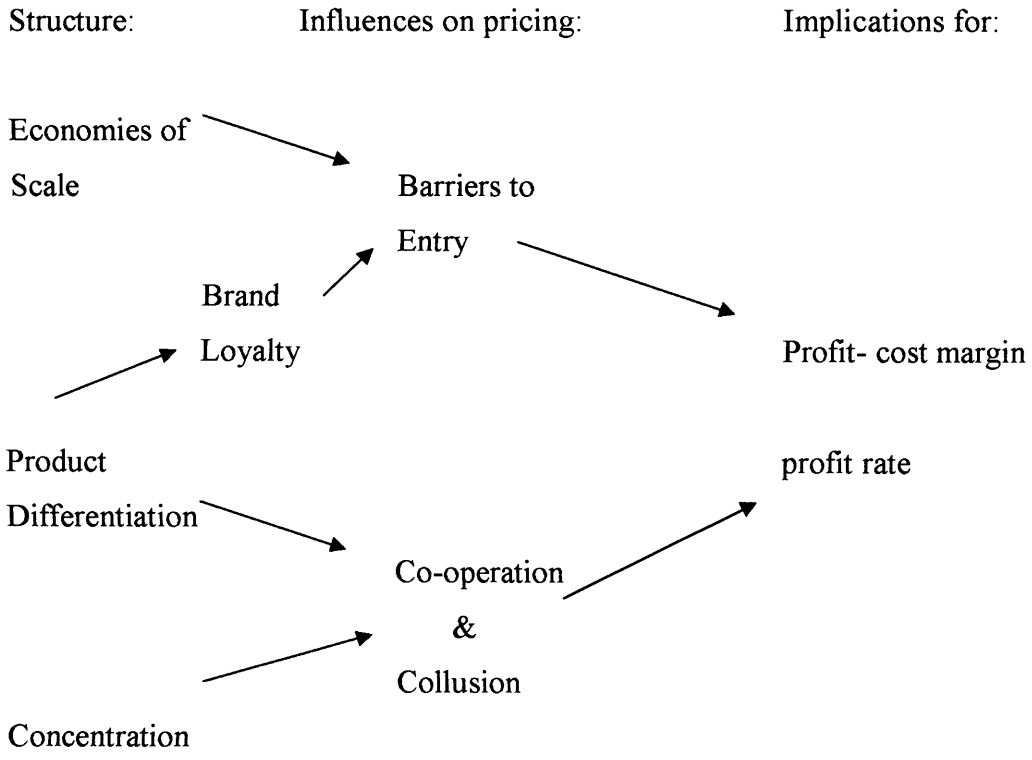


Figure 2.3: links between market structure and profitability, adapted from Hay and Morris (1991)

2.3 Lorenz Curve

The Lorenz curve is a representation of cumulative distribution function. It is commonly used for example to show proportion of national income by percentage of population.

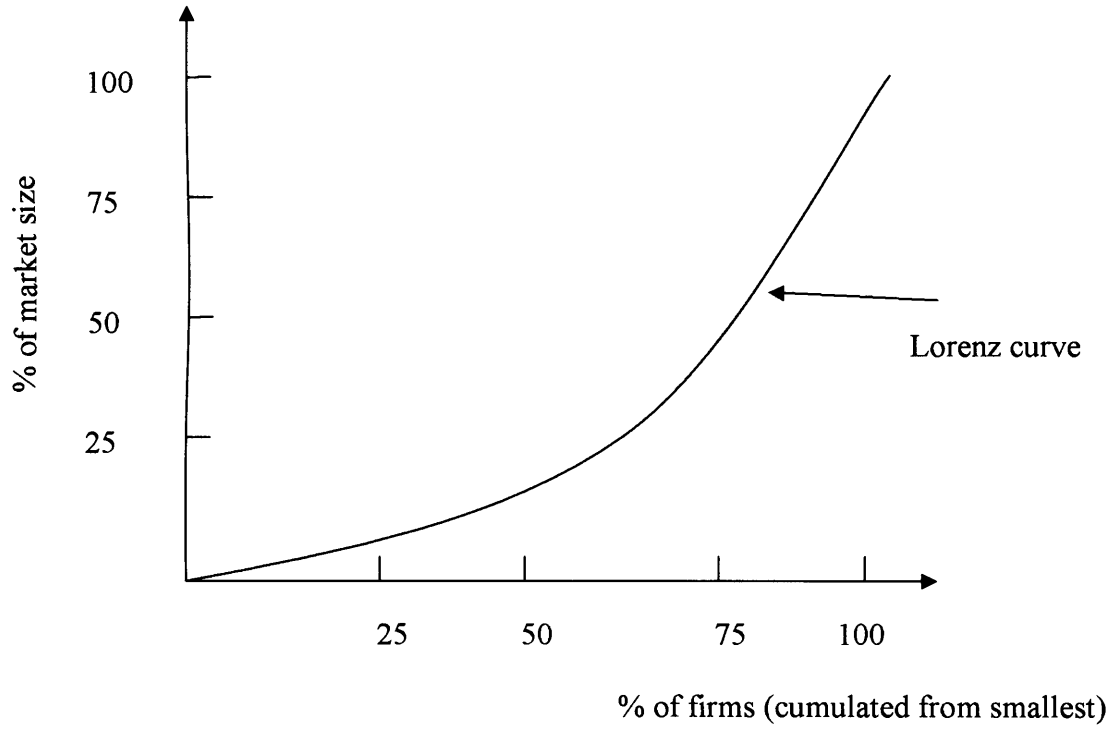


Figure 2.4: The Lorenz curve

Level of inequality exists in measurement of relative concentration. This inequality in share can be recorded in the form of Lorenz curve which shows percentage of market size at Y-axis and percentage of firms (cumulated from smallest). Relative concentration in a market is the extent of derivation of the line of equality from Lorenz curve. The area between line of perfect equality and Lorenz curve is called Gini coefficient. With higher coefficient, higher level of unequal distribution.

2.4 Strategic decision making

In oligopoly, even without collusion, firms should take into consideration their rival's behaviour. In the Cournot model, firms choose profit maximizing price and output with regard to rival's level of out put. In the Bertrand model, firms compete on price since it is assumed price of rivals is given which in turn result in profit reduction (Sloman and Hinde, 2007).

Game theory is used when outcome of strategies are not certain. The prisoner's dilemma is the best example of game theory. Decision tree is often helpful in making decisions. It indicates sequence of decisions by competitor firms and the outcome of each combination of decisions. Credible threat can increase profitability. First mover advantage should be taken to consideration in oligopoly market. It helps firms to increase their profitability in the market with new strategy or new product.

There are other factors, beyond figure 5, which have influences on profitability. All these factors are related to market structure and profitability. Growth is one of them. In theory the relationship between profit and growth can be either positive or negative. However unexpected growth increase profitability but less in concentrated industry. Another factor can be diversification or economies of scope. There are mixed views about diversification. One view is that, it can generate multi market economies which increase profit. It can increase number of concentration which leads to higher possibility of collusion. It can transfer resources to more profitable market and therefore diversified business drive up the economy. However, another view is that diversification result in less profit since it takes focus off the main business (Davis and Lam, 2001).

Geographical dispersion is another factor. This is important since firm's customers are geographically dispersed as well as expensive transportation. This can be also related to buyer concentration.

3. Research background and methodology

3.1 Size distribution of firms

Early work on size distribution has been done by Gibrat (1931). Gibrat's law (Gibrat's rule of proportionate growth) states that growth rate is independent of size of firms. The law assumes that same statistical distribution of growth rate exists at all time for a firm as for all other firms in the same industry. There is considerable evidence that the size distribution of firms is log normal (Gibrat 1931, Voit 2001).

Cabral and Mata (2003) have studied Portuguese manufacture industries. They have found that logarithmic distribution of firms are skewed to the right hand side at the beginning and gradually turn to more symmetric distribution. Therefore, distribution is fairly symmetric with a tendency to skew toward right.

3.2 MA formula

This report will be based on Patrick McCloughan's work on estimation of market concentration in the construction sector. The research makes use of the Department of the Environment Transport and the Regions (DETR) data on the structure of British construction as well as employing the MA method introduced by McCloughan and Abounoori. The data is collected on national level. With regional size distribution data, results are likely to be different, with the market tending to be more concentrated for some specialist trades. It is worth mentioning that one of the reasons for choosing this topic is that there is reliable data which makes the results more trustworthy.

The essential information required when using this method is number of firms in each size class (original size distribution) and the size class corresponding proportions of the total market size (first moment size distribution). The original and first moment size distribution which is the basis of the concentration ratio is the starting point of the formula.

McCloughan (2003 and 2004) underlined that one of the main assumptions in MA formula concerns the distribution of individual firms in the size classes in which the *k*th (e.g. hundred) largest firms falls and its relation to the main formula. Taking to consideration that the information that is available for each size classes is limited to number of firms and their aggregate size, micro-size distribution assumption is required. Micro-distribution is assumed to be uniform in order to have a distinguishable solution for any given particular problem. As a result, the predicted concentration will not exceed the actual level of concentration. The accuracy of estimation depends on the true form of micro-distribution. The less accurate result is achieved when there is a significant difference between true form of micro-distribution and uniformity. This situation is not likely to happen for market with dominant firms but for those markets where size inequalities amongst the very largest firms are pronounced.

To overcome this issue, an upper bound of concentration can be calculated in a way that true concentration falls in between lower and upper estimate. Micro-distribution assumption for upper bound should obey the rules of monopoly. The MA upper bound is driven from formula with consistent interpolation procedure. Therefore point estimation and interval concentration ratio can be calculated using this method. Point estimate is the lognormal median of the MA lower and upper estimate. Point estimate indicates that true concentration ratio value is closer to the MA lower value than to the MA upper value (McCloughan and Abounoori, 2003).

The MA formula is:

$$C_K = 1 - \left[F_1(x_{j-1}) + \left\{ \left(1 - \frac{k}{n}\right) - F_1(x_{j-1}) \right\} \left\{ \frac{F_1(x_j) - F_1(x_{j-1})}{F(x_j) - F(x_{j-1})} \right\} \right]$$

Where C_k is the k-firm concentration, F (x_j) and F (x_{j-1}) represent the sample original cumulative distribution function (cdf) values of size classes j and j-1, and F_1 (x_j) and F_1 (x_{j-1}) give the corresponding first moment cumulative distribution function values.

McCloughan and Abounoori (2003) outline two cases based on the term $\left(1-\frac{k}{n}\right)$ which is the value of original distribution evaluated at x_k.

First, where $\left(1-\frac{k}{n}\right)=F\left(x_j\right)$, MA equation simplifies to $C_k=1-F_1\left(x_j\right)$ and C_k is predicted exactly. Second, where $F\left(x_{j-1}\right)<\left(1-\frac{k}{n}\right)<F\left(x_j\right)$ the formula either underestimates concentration or predicts exactly concentration exactly in the case the uniform assumption is correct. The outcome of equation is very accurate when the size difference between top firms (upper tail size inequality) is not too pronounced. However with high upper tail size inequality, MA formula gives an interval estimate of concentration which calls for two further series.

Third, where $F\left(x_{j-1}\right)<\left(1-\frac{k}{n}\right)\leq F\left(x_j\right)$, the maximum possible value is obtained which C_k can acquire. Fourth, actual concentration is guaranteed to be lie in between upper bound and the outcome of MA formula. The lower estimate is more accurate when there is a short distance between upper and lower concentration estimate. On the other hand, larger MA interval results in greater upper tail firm size inequality as well as more flexible uniform interpolation procedure.

4. Data Analysis

There are two parts to this section. Firstly, tables from McCloughan's study on construction market in Britain are updated and results will be discussed. The next step is to correlate those results to profitability obtained from FAME data base.

4.1 Updating McCloughan data

There are three tables in the article which is going to be updated. Titles of the tables are: share of 100 largest firms in British construction sector 1971-99 in terms of work done, share of largest five firms in British main trades by work done 1980-98 and share of largest 5 firms in British specialist trades by work done 1980-98.

4.1.1 Aggregate concentration 1971-2006

Table 1 shows C100 estimate exploiting MA method in aggregate concentration in British construction when concentration size is measured by work done. The closer the values of upper and lower estimate together, the smaller the difference in size between firms within the same size level of industry. Years such as 1970s, 1991, 1998 and 2000 have higher boundary in compare to others which means that there were a few larger firms than others in the industry. However, year 1999 can be distinguished since the exact concentration ratio has been found. This is due to the fact that MA upper and lower estimates as well as point estimate are equal in that year (i.e. we have actual data for construction market share of top 100 in that year).

Year	MA lower estimate	MA upper estimate	Point estimate
1971	0.2571	0.3298	0.2912
1972	0.2151	0.2838	0.2471
1973A	0.2351	0.3048	0.2656
1973B	0.2187	0.2879	0.2509
1974	0.2191	0.3056	0.2588
1975	0.2496	0.3343	0.2889
1976	0.2388	I0.3100	0.2721
1977	0.2282	0.2979	0.2607
1978	0.2070	0.2697	0.2363
1979	0.2051	0.2501	0.2265
1980	0.2020	0.2415	0.2209
1981	0.1977	0.2181	0.2076
1982	0.2045	0.2182	0.2112
1983	0.1817	0.1921	0.1868
1984	0.1882	0.2014	0.1947
1985	0.1944	0.1997	0.1970
1986	0.1912	0.1963	0.1937
1987	0.1937	0.2003	0.1970
1988	0.2143	0.2293	0.2217
1989	0.2221	0.2399	0.2308
1990	0.2403	0.2596	0.2498
1991	0.2380	0.3264	0.2787
1992	0.2133	0.2883	0.2480
1993	0.2221	0.2784	0.2487
1994	0.2135	0.2685	0.2394
1995	0.2211	0.2819	0.2497
1996	0.2223	0.2797	0.2494
1997	0.2082	0.2770	0.2401
1998	0.2179	0.2927	0.2525
1999	0.2134	0.2134	0.2134
2000	0.1821	0.2401	0.2091
2001	0.1809	0.2136	0.1965
2002	0.2196	0.2484	0.2335
2003	0.2164	0.2528	0.2339
2004	0.2256	0.2591	0.2418
2005	0.2368	0.2551	0.2458
2006	0.2386	0.2603	0.2492

Table 4.1: Share of 100 largest firms in British construction sector 1971-2006

The results specify that concentration ratio of top 100 construction firms is around 20%. McCloughan (2003) points out great volatility in construction sector measured by work done which makes this sector volatile in the short run. In general, those years with recession and slow economy have larger boundary. The most recent example is early 2000s recession. The reason behind this could be that relatively small firms can not tolerate slow market which results in their bankruptcy. Therefore the proportion of market share would be acquired by larger firms which result in expansion of firms.

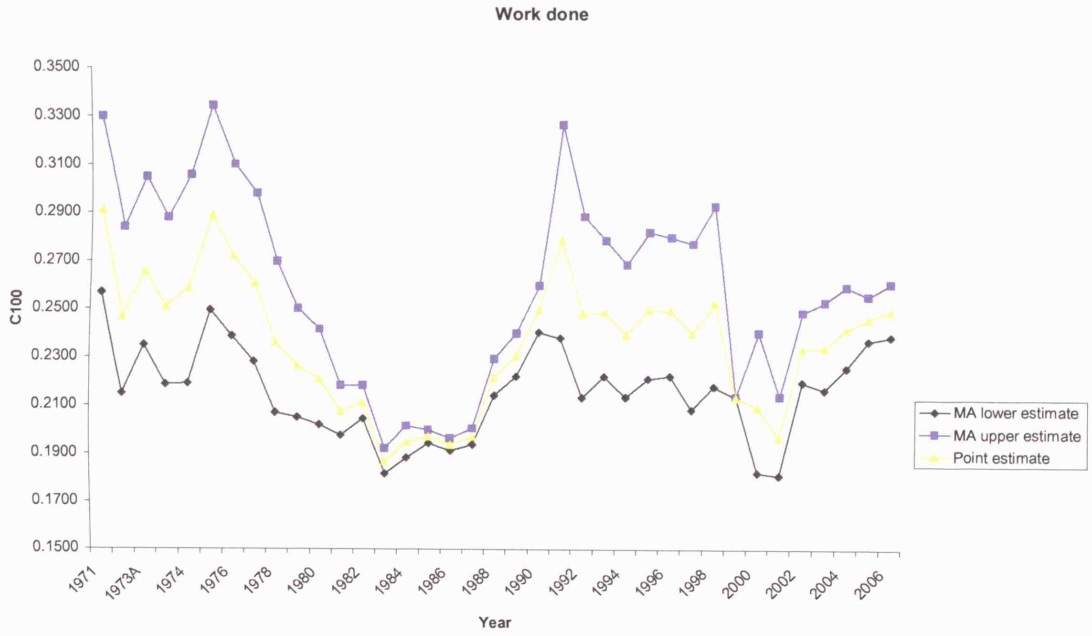


Figure 4.1: Share of 100 largest firms in British construction sector 1971-2006

4.1.2 Concentration in main trades 1980-98 inclusive and 2001-6

The data is provided on three main activities: house building, civil engineering and non-residential buildings. Moreover, fourth which is all main trades can be added. The result of applying MA formula to estimate five-firm concentration has been tabulated below. The results include work done by contractors as well as housing developers.

Year	MA lower estimate	MA upper estimate	Point estimate
1980	0.0975	0.4873	0.2180
1985	0.1282	0.4104	0.2294
1990	0.1448	0.4633	0.2590
1995	0.1521	0.3651	0.2357
1998	0.1364	0.3274	0.2113
2001	0.1015	0.1425	0.1203
2002	0.0659	0.0770	0.0712
2003	0.0430	0.1305	0.0749
2004	0.1617	0.2018	0.1806
2005	0.1606	0.2007	0.1795
2006	0.0689	0.1841	0.1126

Table 4.2: Share of largest five firms in house building by work done

The highest five-firm concentration ratio at house building occurred at year 1980. Afterwards, a fall can be observed during 1980-1985. Another rapid reduction in concentration takes place after rise during 1985-1990 periods. This trend continues until year 2002 which reaches to 10% at all time low. However, there has been steady increase in recent years apart from 2006.

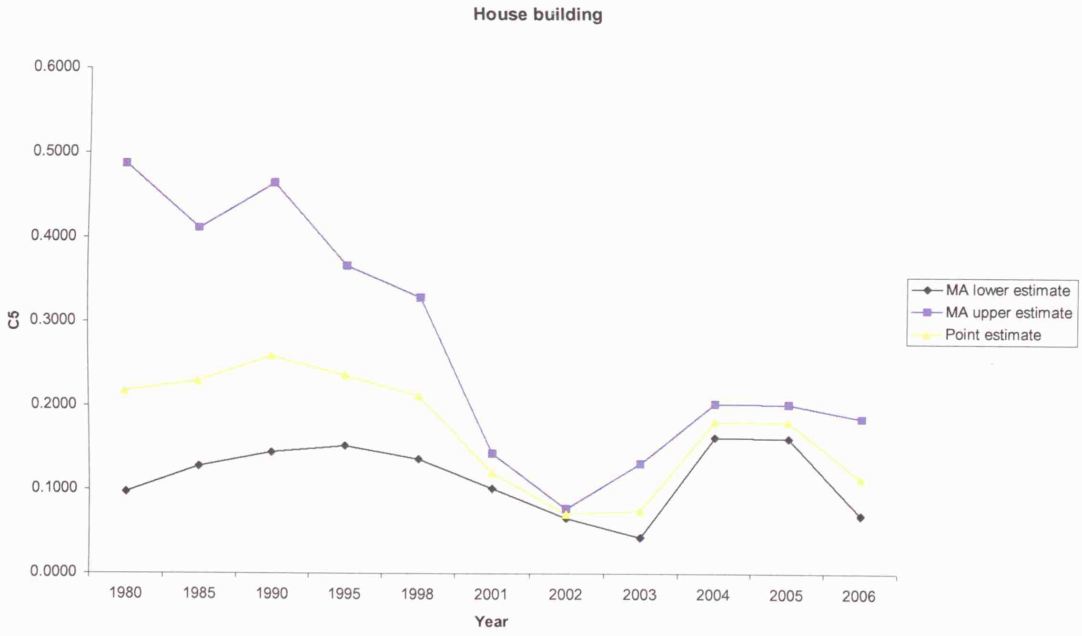


Figure 4.2: Share of largest five-firm in house building by work done

Civil engineering trade has highest concentration ratio which is result of economy of scale. The most noticeable is 1995 where concentration ratio is at its peak. There is a downward trend after peak which results in the lowest concentration ratio which is around 10%. The most likely factor of this rapid reduction is increase in number of firms at the period. McCloughan (2003) believes that the possible reason behind increase in number of firms is change in employment practice rather than technology or demand changes. This in turn, demonstrates lack of barriers to entry in this particular trade in Britain.

Year	MA lower estimate	MA upper estimate	Point estimate
1980	0.0793	0.2220	0.1327
1985	0.0963	0.2119	0.1428
1990	0.1631	0.1958	0.1787
1995	0.2141	0.3426	0.2708
1998	0.0704	0.2536	0.1336
2001	0.0902	0.1202	0.1041
2002	0.1900	0.2442	0.2154
2003	0.1160	0.3015	0.1870
2004	0.2131	0.3043	0.2547
2005	0.1513	0.3022	0.2138
2006	0.1207	0.2410	0.1705

Table 4.3: Share of largest five firms in civil engineering by work done

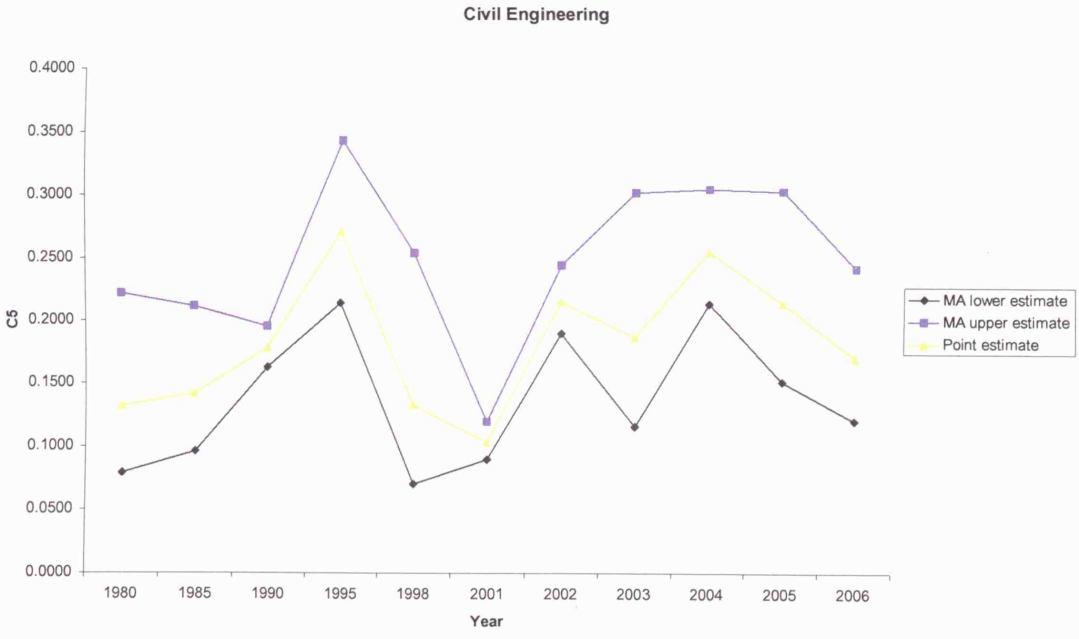


Figure 4.3: Share of largest five firms in civil engineering by work done

Non-residential building trade has steadier growth in comparison to the previous two trades. Non-residential building trade starts with relatively low concentration ratio and gradually with few set back increases. This can be attributed to the fact that most firms tend to be more active in other main trades as profit could be more rewarding. In recent years, the difference between upper estimate and lower estimate increases year by year apart from 2004. This demonstrates that the largest firms are much larger than the nth largest firms in terms of work done in non-residential building trade which can be observed in figure 11.

Year	MA lower estimate	MA upper estimate	Point estimate
1980	0.0205	0.0287	0.0243
1985	0.0175	0.3394	0.0771
1990	0.0374	0.2242	0.0916
1995	0.0418	0.1673	0.0836
1998	0.0328	0.1573	0.0718
2001	0.0200	0.1624	0.0570
2002	0.0411	0.2104	0.0929
2003	0.0453	0.2719	0.1110
2004	0.0421	0.2778	0.1081
2005	0.0676	0.3082	0.1443
2006	0.0291	0.3106	0.0951

Table 4.4: Share of largest five firms in non-residential building by work done

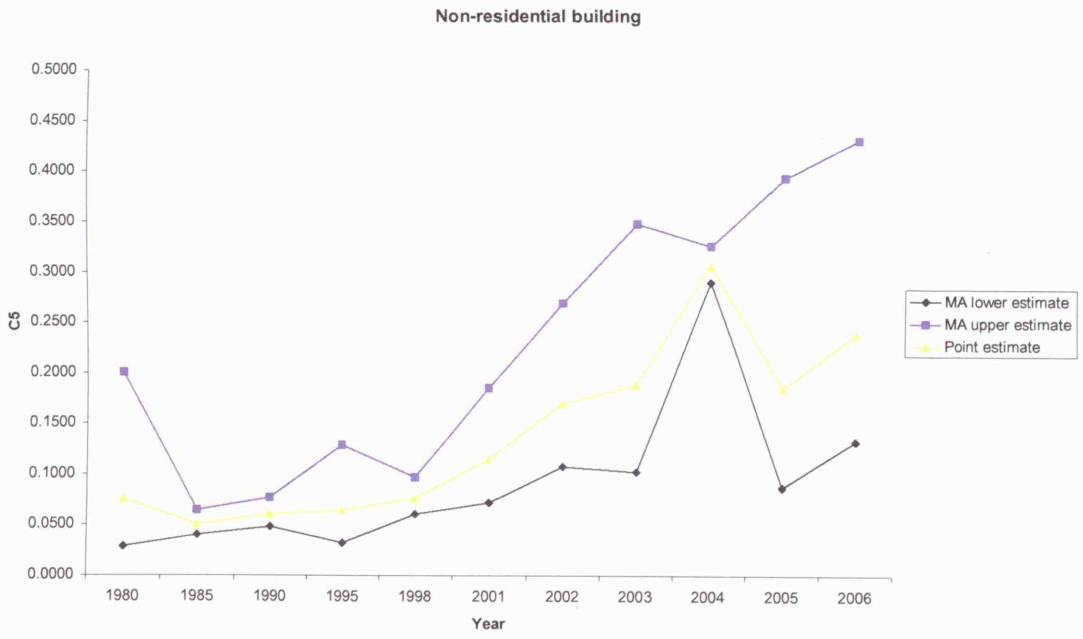


Figure 4.4: Share of largest five firms in non-residential building by work done

All main trades are the sum of the previous three main trades. Figure 12 reveals that there is a considerable difference between lower and upper estimate which leads to the conclusion that none of the main trades discussed above are concentrated. In contrary, in national scale, main trades have low concentration (fragmented) markets. It should be noted that point estimates in sum of main trades are higher than in individual main trades. This occurs when the same top five firms occur in two or more of the main trades exist.

Year	MA lower estimate	MA upper estimate	Point estimate
1980	0.0287	0.2009	0.0759
1985	0.0403	0.0645	0.0510
1990	0.0482	0.0771	0.0610
1995	0.0323	0.0129	0.0204
1998	0.0608	0.0972	0.0769
2001	0.0720	0.1859	0.1157
2002	0.1078	0.2696	0.1705
2003	0.1024	0.3480	0.1888
2004	0.2897	0.3258	0.3072
2005	0.0871	0.3931	0.1850
2006	0.1327	0.4303	0.2389

Table 4.5: Share of largest five firms in all main trades by work done

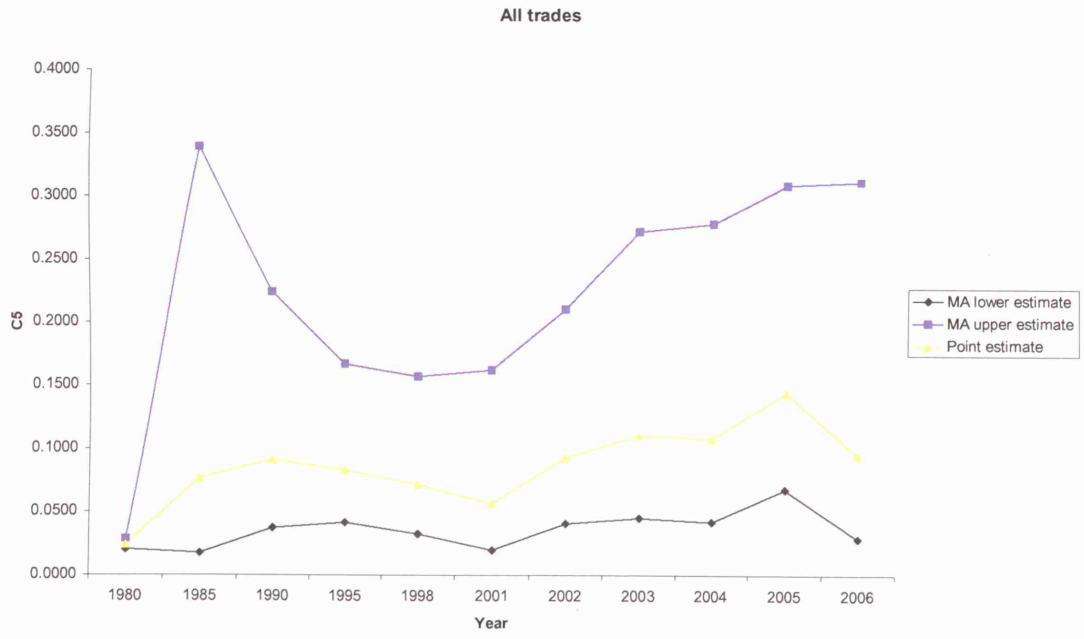


Figure 4.5: Share of largest five firms in all main trades by work done

4.1.3 Concentration in specialist trade 1980-99 and 2001-6

The results from applying the MA method to estimate five-firm concentration ratio for the various specialist's trades in 1980-99 and 2001-6 are tabulated in table 6 and 7. Tables have been separated as a result of the fact that specialist trade names and categories have been altered from 2001 onwards.

McCloughan (2003) divides the specialist categories into capital-intensive and labour-intensive. Specialist trades such as scaffolding specialists, insulation specialist and demolition can be categorised under capital-intensive. Whereas, plumbing, plasterers, carpenters and joiners can be categorised as the latter category. Taking to consideration that sunk costs in labour-intensive specialist is relatively less than capital-intensive; therefore barrier to entry and exit is very low in labour-intensive specialists. However, in the former category, contractor serves a wider geographic market. Moreover, demand side is different between two categories in relation to concentration. The less concentrated specialist trades clients are mainly private contractors whereas more concentrated trades often trade with government and commercial clients.

In scaffolding in 1999, 2001 and 2002 the number of firms in the top size is 5. This means that for those years we know the actual five-firm concentration ratio (whereas for other years we need to estimate it using the MA method). Scaffolding specialist five-firm contractors accounts for exactly 56.3%, 17.6% and 41.5% respectively. Scaffolding specialist trade has been relatively concentrated 1980-99. However, the lowest concentration ratio has been recorded in 2001 (17.6%). Taking to consideration that this trade is capital-intensive, it is expected that concentration ratio is relatively high.

	MA lower					MA upper					Point est.				
Specialist trade	**1980**	**1985**	**1990**	**1995**	**1999**	**1980**	**1985**	**1990**	**1995**	**1999**	**1980**	**1985**	**1990**	**1995**	**1999**
Scaffolding specialist	0.397	0.476	0.592	0.43	0.563	0.556	0.571	0.43	0.516	0.563	0.47	0.521	0.505	0.471	0.563
Constructional engineering	0.181	0.207	0.154	0.265	0.288	0.29	0.207	0.215	0.265	0.461	0.229	0.207	0.182	0.265	0.364
Insulation specialist	0.196	0.175	0.216	0.22	0.264	0.469	0.279	0.302	0.356	0.582	0.303	0.221	0.255	0.28	0.392
Demolition specialist	0.094	0.143	0.12	0.114	0.261	0.094	0.172	0.168	0.16	0.366	0.094	0.157	0.142	0.135	0.309
Flooring & wall tiling	0.126	0.157	0.21	0.131	0.185	0.202	0.188	0.252	0.236	0.223	0.16	0.172	0.23	0.176	0.203
Plant hire	0.082	0.13	0.068	0.085	0.175	0.164	0.156	0.3	0.272	0.175	0.116	0.142	0.143	0.152	0.175
Electrical contractors	0.142	0.141	0.205	0.144	0.118	0.171	0.282	0.25	0.173	0.189	0.156	0.199	0.227	0.158	0.15
Flooring contracting	0.116	0.159	0.204	0.135	0.117	0.185	0.155	0.327	0.243	0.117	0.146	0.157	0.258	0.181	0.117
Glaziers	0.093	0.051	0.105	0.093	0.108	0.149	0.124	0.147	0.186	0.13	0.118	0.08	0.124	0.131	0.118
Roofers	0.069	0.077	0.103	0.093	0.092	0.22	0.169	0.165	0.149	0.092	0.123	0.114	0.13	0.117	0.092
Painters	0.02	0.024	0.103	0.062	0.049	0.159	0.118	0.124	0.112	0.157	0.057	0.053	0.113	0.084	0.088
Carpenter & joiners	0.025	0.016	0.024	0.02	0.044	0.051	0.031	0.052	0.036	0.044	0.036	0.022	0.035	0.027	0.044
Plasterers	0.044	0.044	0.034	0.03	0.038	0.088	0.067	0.048	0.096	0.138	0.062	0.054	0.04	0.054	0.073
Plumbers	0.041	0.027	0.03	0.027	0.037	0.106	0.027	0.073	0.053	0.066	0.066	0.027	0.047	0.037	0.049
Miscellaneous	0.214	0.119	0.1	0.075	0.092	0.257	0.379	0.135	0.149	0.092	0.235	0.212	0.116	0.105	0.092
Asphalt & tar sprays	0.278	0.283	0.152	0.245	0.386	0.389	0.283	0.455	0.44	0.464	0.329	0.283	0.263	0.328	0.423
Reinforced concrete specialist	0.175	0.179	0.182	0.19	0.223	0.419	0.429	0.364	0.533	0.312	0.27	0.277	0.257	0.318	0.264
Heating and ventilating engineering	0.101	0.145	0.157	0.172	0.178	0.222	0.204	0.313	0.275	0.178	0.15	0.172	0.222	0.218	0.178
Suspended ceiling specialist	0.157	0.106	0.144	0.119	-	0.188	0.234	0.432	0.19	-	0.171	0.158	0.249	0.15	-

Table 4.6: Share of largest five-firm in specialist trades by work done 1980-99, Source: McCloughan and Abounoori (2003)

	MA lower					MA upper							Point est.					
Specialist trade	2001	2002	2003	2004	2005	2006	2001	2002	2003	2004	2005	2006	2001	2002	2003	2004	2005	2006
Demolition	0.108	0.107	0.162	0.095	0.057	0.057	0.149	0.137	0.248	0.131	0.106	0.16	0.127	0.162	0.095	0.112	0.077	0.148
Test drilling and boring	0.64	0.031	0.4	0.333	0.256	0.256	0.8	0.063	0.467	0.5	0.308	0.286	0.716	0.4	0.333	0.408	0.281	0.247
Roofing	0.058	0.06	0.075	0.085	0.08	0.08	0.046	0.072	0.097	0.12	0.094	0.111	0.052	0.075	0.085	0.101	0.086	0.086
Construction of highways	0.161	0.192	0.33	0.101	0.066	0.066	0.273	0.275	0.275	0.26	0.229	0.263	0.21	0.33	0.101	0.162	0.123	0.239
Construction of water ways	0.389	0.34	0.325	0.642	0.707	0.707	0.487	0.487	0.407	0.83	0.707	0.559	0.435	0.325	0.642	0.73	0.707	0.521
Scaffolding	0.176	0.415	0.278	0.431	0.262	0.262	0.176	0.415	0.333	0.498	0.426	0.346	0.176	0.278	0.431	0.464	0.334	0.331
Installation of electrical	0.014	0.168	0.156	0.25	0.093	0.093	0.105	0.235	0.233	0.317	0.187	0.178	0.039	0.156	0.25	0.282	0.132	0.154
Insulation Activities	0.358	0.052	0.038	0.092	0.193	0.193	0.394	0.065	0.152	0.096	0.272	0.171	0.376	0.038	0.092	0.094	0.229	0.153
Plumbing	0.079	0.103	0.03	0.057	0.074	0.074	0.108	0.135	0.015	0.066	0.117	0.135	0.092	0.03	0.057	0.061	0.093	0.102
Plastering	0.121	0.097	0.075	0.067	0.144	0.144	0.189	0.191	0.137	0.081	0.178	0.174	0.151	0.075	0.067	0.074	0.16	0.13
Joinery Installation	0.016	0.044	0.075	0.045	0.024	0.024	0.019	0.109	0.081	0.057	0.032	0.07	0.018	0.075	0.045	0.051	0.028	0.06
Floor and wall covering	0.082	0.075	0.087	0.061	0.1	0.1	0.093	0.089	0.1	0.154	0.1	0.149	0.087	0.087	0.061	0.097	0.1	0.143
Painting	0.093	0.091	0.124	0.13	0.132	0.132	0.14	0.118	0.147	0.18	0.158	0.07	0.114	0.124	0.13	0.153	0.144	0.046
Glazing	0.051	0.135	0.035	0.011	0.092	0.092	0.058	0.17	0.051	0.011	0.11	0.077	0.054	0.035	0.011	0.011	0.101	0.036
Plant hire	0.153	0.063	0.099	0.174	0.033	0.033	0.153	0.09	0.232	0.251	0.055	0.286	0.153	0.099	0.174	0.209	0.043	0.265
Other works	0.09	0.034	0.097	0.05	0.031	0.031	0.144	0.061	0.157	0.066	0.036	0.104	0.114	0.097	0.05	0.057	0.034	0.049
All	0.011	0.03	0.014	0.016	0.018	0.018	0.121	0.154	0.183	0.188	0.198	0.2	0.036	0.014	0.016	0.054	0.059	0.061

Table 4.7: Share of largest five-firm in Specialist trades by work done 2001-6, Source: calculated by author

4.2 Profitability

After updating McCloughan tables in the previous section, this section considers the evidence about profitability of each specialist trade from 2001-6. It is worth mentioning, that main trades are not going to be discussed. This is due to the fact that main trade's categories are not identical between FAME and the DBERR data base. However, even for specialist trades there are some problems. As mentioned earlier, from 2001 onwards categories in DBERR have been altered. These changes include name alteration, merging or eliminating specialist trades. Examples can be noticed when comparing specialist trades of table 8 with tables 6 and 7. Therefore, it is challenging to be able to analyse a particular specialist trade over a long period of time.

Three profitability ratios have been chosen: Gross profit/ Total Asset (GP/TA), Operating profit/ Total asset less current liabilities (OP/TALL) and Operating profit/ turnover (OP/TO). Operating profit can be defined as earnings before interest and taxes. Gross profit is the difference between revenue and cost of the providing the service. Voulgaris et al (2002) put forward the issue of bankruptcy. There are ratios that can help in bankruptcy prediction: gross profit to total asset, current liability to total asset and long-term debt to long-term capital. Considering available data, gross profit to total asset is the best alternative. It reflects on the relative return to total assets. Therefore high value in this ratio leads to less possibility of failure in that period.

Operating profit/ Total asset less current liabilities ratio represents Return on Capital Employed (ROCE). This ratio provides more information on firm's performance. This paints a more realistic picture about firm's situation in the market. This ratio assists investors to decide in an investment in a firm.

The third ratio is also known as profit margin. This ratio has been included since it is fine indication of firm's performance especially in comparison to others.

It can be observed from graph plotted for each specialist trade that as would be expected the mean values of these ratios are in descending order. Therefore, Gross profit/ Total asset have highest mean value whereas profit margin produces the lowest mean ratio. In most cases value of turnover is higher than value of total asset less current liability. Therefore profit margin value is lower than ROCE ratio.

4.2.1 Method

In order to find out the specialist trade and the required ratios from the FAME data base the following search criteria have been used:

- Primary SIC code for each specialist trade
- Firms with available data for Capital Employed and Turnover and number of employment for the period of 2001-2006
- Exclude all firms with negative Capital Employed. However, firms with negative profit are included in the data.
- Select the required data for obtaining ratios such as Gross profit, Total Asset and etc.
- Searching through data for any unusual numbers and eliminating them.

It is worth mentioning that weighted or aggregate mean has been used in calculation. This indicates the all firms do not contribute equally to the final mean. For example, for the second ratio, aggregate mean is equal to sum of all operating profit divided by sum of all Total Asset less Current Liability.

4.2.2 Some initial observation

By glance at Table 4.9, we can observe that **insulation** activities have relatively higher profitability than most other specialist trades. Margin and ROCE are both above the all trades mean in all years. This can be attributed to the fact that there are fewer participants in this market in comparison to other specialist markets which results in less competition and more profit. It should not be forgotten that this specialist trade is capital-intensive (Table 4.8) which can be another reason for high profitability since there are high exit and entry barriers. It is worth mentioning that GP/TA shows an upward trend between 2001 and 2006. The highest GP/TA rate in all trades is for insulation activities in 2006.

Specialist trade	TALL/Number of employees
Demolition	49.206
Test drilling and boring	34.39
Roofing	25.68
Scaffolding	32.88
Installation of electrical	40.43
Insulation Activities	54.19
Plumbing	28.54
Plastering	22.30
Joinery Installation	36.14
Floor and wall covering	32.11
Painting & Glazing	30.49
Other works	439

Table 4.8: Specialist trade in capital or labour intensive

High ratios in this table indicate that the specialist trade is capital intensive and at the other end specialist trade is categorised as labour intensive. The best examples of capital intensive trades are Insulation activity and Demolition as well as other works. Plastering, Plumbing and roofing can be named in the labour-intensive category. It is worth mentioning that this table has been produced using data collected from FAME database with variables such as number of employees and Total Asset Less current Liability.

On the other hand, **plumbing** is one of the least profitable trades. The ratios almost stay the same over the years. Plumbing is labour-intensive activity (McCloughan, 2004) so a relative labour market constraint here may increase share of wages in value added at times of high demand. Surprisingly enough, plumbing which has a low ratio of gross profit to total asset has one of the highest levels of return on capital investment. Plumbers make more use of firm's credit which explains the discrepancy.

Considering OP/TALL, **test drilling and boring** has one of the worst performances in the past 6 years. There is fluctuation from starting point to the end. However, the last decline takes the value to a negative one which illustrates the there is an actual loss in an investment in this specialist trade. The reason can not be explained with available data. Trades with high ROCE are scaffolding and plastering.

As it can be observed form table 4.9, number of firms with the required criteria for each specialist trade is relatively small. This certainly applies to the Test drilling and boring trade which leads in non-satisfactory results. The mean profitability indicated in Table 4.8 is given for period of six years starting from year 2001.

As mentioned earlier, the most important ratio here is Operating profit over Total Asset less Current Liability which is Return on Capital Employed. Therefore, this ratio indicates profitability in terms of capital invested in a firm.

With a glance at the average number of OP/TALL, it can be noticed that most of the specialist trade have a double digit percentage in Return on Capital Employed. This, in turn, points out the high level of healthiness of each trade which could result in more investment in those specialist trades. The highest ratio belongs to scaffolding trade which can be attributed the fact that this trade is labour-intensive.

Next ratio that will be under microscope is GP/TA. The ratio for each trade is relatively high with range from 16 to 30 percent. It appears that in the given years, installation of electrical trade is one of the most profitable trade and hence the high ratio of GP/TA. It should not be forgotten that low total asset can increase the ratio which is the case here since installation of electrical trade is labour-intensive.

However, labour-intensive trade alone can not affect the ratio. The clear example is plumbing trade which has the one of the lowest ratios.

The last ratio is OP/TO. The values for each trade are mostly less than 10 percent. Certainly, we do not consider the value for test drilling and boring since the number of firms is very few in this trade. Insulation trade which is capital-intensive trade has the highest ratio. This can be ascribed with the excellent market in this particular trade.

Table 4.9 has been formed by calculating the ratios for each specialist trade in each year and then average is taken. Standard deviation shows the data range of ratios. For some specialist trade, the SD is greater than mean which means that there are firms with negative gross or operating profit in that particular data which results in negative ratio. Best example is Scaffolding trade GP/TA trade which suggest there are a few firms with relatively large negative gross profit. It can be observed from *Appendix c* that the selected sample is not normally distributed which indicates that we have to be cautious about the results.

Specialist trade	GP/TA		OP/TALL		OP/TO	
	Mean	SD	Mean	SD	Mean	SD
Demolition	26.19	25.29	10.90	13.56	6.81	7.18
Test drilling and boring	16.70	7.91	7.35	18.21	17.35	7.47
Roofing	25.57	28.16	12.97	26.89	5.95	5.50
Scaffolding	27.75	43.95	16.96	17.36	5.42	8.48
Installation of electrical	30.27	15.59	9.20	4.49	3.67	6.64
Insulation Activities	32.22	23.45	15.09	15.17	11.61	14.25
Plumbing	18.54	23.84	11.68	15.41	5.19	9.46
Plastering	25.68	18.32	15.52	19.16	6.74	7.80
Joinery Installation	21.62	36.06	12.51	21.03	6.01	4.34
Floor and wall covering	28.88	32.39	10.77	11.21	6.48	10.23
Painting & Glazing	28.94	37.42	9.72	12.03	5.37	4.13
Other works	18.52	17.33	9.97	8.37	4.96	9.03

Table 4.9: Mean profitability of specialist trades for period of 2001-6 (Source: Fame data base)

Specialist trade	GP/TA						OP/TALL						OP/TO					
	2006	2005	2004	2003	2002	2001	2006	2005	2004	2003	2002	2001	2006	2005	2004	2003	2002	2001
Demolition	21.37	23.3	21.1	25.24	27.21	26.89	11.47	12.68	8.43	8.95	11.56	12.33	8.46	8.98	5.96	4.82	6.33	6.31
Test drilling and boring	22.57	22.45	23	24.24	19.57	24.09	-0.53	9.54	6.68	11.39	7.51	11.17	-0.29	5.43	3.31	5.6	5.41	7.85
Roofing	21.75	24.17	24.7	27.59	27.61	27.62	11.28	13.99	13.5	11.6	12.63	14.8	7.3	6.89	5.84	4.88	5.09	5.72
Scaffolding	26.31	28.88	29.8	31.14	24.2	26.19	15.08	15.28	15.82	21.06	16.37	18.14	5.11	4.85	4.97	6.1	6.12	5.37
Installation of electrical	22.88	30.88	29.9	32.45	33.9	31.66	9.25	10.82	6.06	9.35	11.12	8.6	64.51	22.42	3.33	16.5	25.45	4.91
Insulation Activities	48.09	40.76	29.1	31.25	20.33	23.83	12.84	13.57	16.79	18.78	13.29	15.24	12.92	11.63	14.95	14.02	7.48	8.65
Plumbing	14.06	13.74	20.1	20.54	21.01	21.79	17.68	15.88	12.12	7.44	7.79	9.18	8.91	7.79	4.94	3.09	3.04	3.34
Plastering	20.37	22.2	24.4	30.38	28.68	28.08	14.23	15.99	16.07	19.87	16.28	10.66	7.59	7.23	7.22	8.35	6.15	3.87
Joinery Installation	17.69	20.34	21.3	22.36	24.34	23.71	10.79	13.61	13.93	12.36	12.41	11.97	6.95	8.25	6.24	5.13	5.06	4.41
Floor and wall covering	26.54	28.81	26.9	28.93	30.96	31.15	10.62	10.85	10.39	9.42	11.17	12.14	7.2	6.89	6.55	5.61	6.11	6.53
Painting & Glazing	26.43	27.9	28.8	28.88	27.5	34.1	8.05	9.43	8.04	8.92	11.46	12.39	4.91	6	5.41	5.38	5.17	5.34
Others work	16.66	16.95	17.5	20.04	19.8	20.15	9.18	8.96	8.65	8.46	11.15	13.42	5.61	4.33	5.08	4.18	5.05	5.51
Mean	23.73	25.03	24.72	26.92	25.43	26.61	10.83	12.55	11.37	12.30	11.90	12.50	11.60	8.39	6.15	6.97	7.21	5.65

Table 4.10: Profitability of specialist trades (Source: Fame data base)

GP/TA = Gross Profit/ Total Asset

OP/TALL = Operating Profit/ Total Asset Less current Liability

OP/ TO = Operating Profit/ Turnover

4.2.3 Comparison between FAME and MA results

Table 4.11 shows the comparison between two sets of data. Notice that standard deviation is calculated with respect to turnover of the sample in order to give us an idea about size of firms within search criteria. Concentration ratio for MA has been derived from average of point estimate of Table 4.7. Whereas in the FAME database section, sum of five biggest turnovers have been divided to sum of all turnover for a particular year and average is taken for all six years. Mean of turnover or work done have been divided by number of firms in the specialist trades with from 2001-6.

Specialist trade	Number of firms	Average Turnover th GBP	SD	Concentration ratio		Mean th GBP	
				MA	FAME	Turnover (FAME)	Work done(DBERR)
Demolition	73	6391	14653	0.120	0.76	87.5	82.18
Test drilling and boring	15	3169	5776	0.398	0.99	211.3	23.30
Roofing	223	2618	6720	0.081	0.32	11.7	26.75
Scaffolding	449	4168	32607	0.336	0.51	9.3	77.81
Installation of electrical	905	8232	41550	0.169	0.23	9.1	37.28
Insulation Activities	88	8424	19352	0.164	0.45	95.7	47.96
Plumbing	532	2733	7823	0.073	0.21	5.1	27.00
Plastering	92	1928	4455	0.110	0.52	21.0	20.51
Joinery Installation	271	1872	6933	0.046	0.47	6.9	17.62
Floor and wall covering	185	3130	12336	0.096	0.62	16.9	21.93
Painting & Glazing	352	2903	10217	0.080	0.34	8.2	19.62
Other works	501	4478	22286	0.067	0.37	8.9	36.19

Table 4.11: Comparison between FAME and MA results

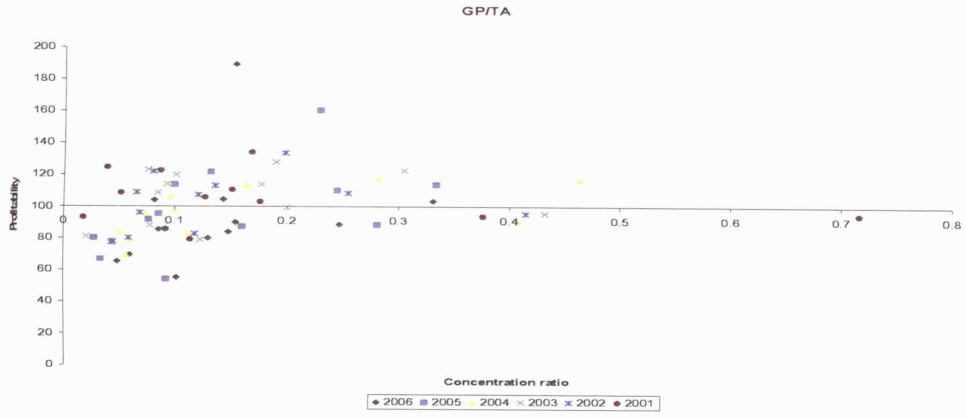
High standard deviation indicates large range of data. Clearly, there are a few firms with large turnover and many firms with low turnover. Given that turnover can not be negative, very large SD points out firms with relatively large turnover. This is true in case of Installation of electrical as well as other works.

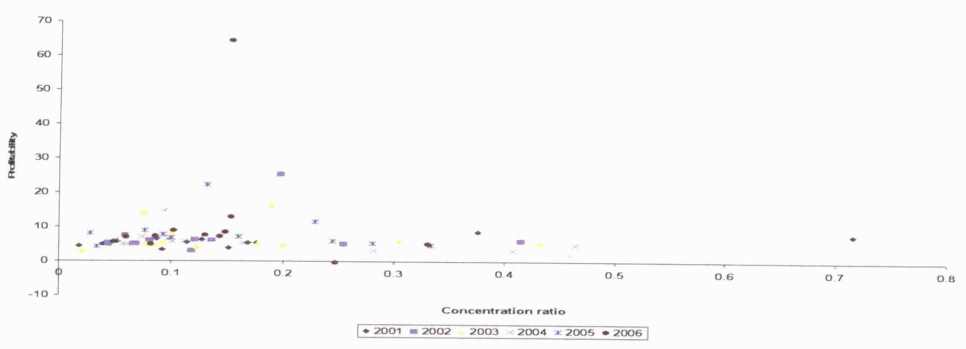
Concentration ratio calculated from MA is generally lower than concentration in FAME. The reason can be attributed to the way that MA formula obtain concentration ratio and the fact that there is a size classification as well as uniformity assumption of the data since only number of firms and their aggregate size information is available. Another reason could be the difference in data available at FAME and Construction Statistics 2007.

Before comparing the mean turnover from FAME and mean work done from Construction Statistics, it is worth mentioning that value of work done is greater than Value Added but smaller than gross output. Therefore, it is expected to have higher mean work done in compare to mean turnover. There are a few exceptions in Table 4.11 which is due to the fact that the numbers of firms in those particular firms are relatively small and therefore the ratio is relatively large.

4.3 Concentration and Profitability relation

This section considers the relationship between concentration and profitability that have been described separately in the previous section. There are four factors that should be considered in plotting any graph. They are: year, concentration ratio, trade and profitability. It has been concluded the best course of action is to plot concentration ratio against profitability for 2001-6 time period in order to test the first hypothesis. Since there are three profitability ratios, a graph is plotted for each ratio. Each dot within the graph represents a specialist trade. The graphs have been normalised.





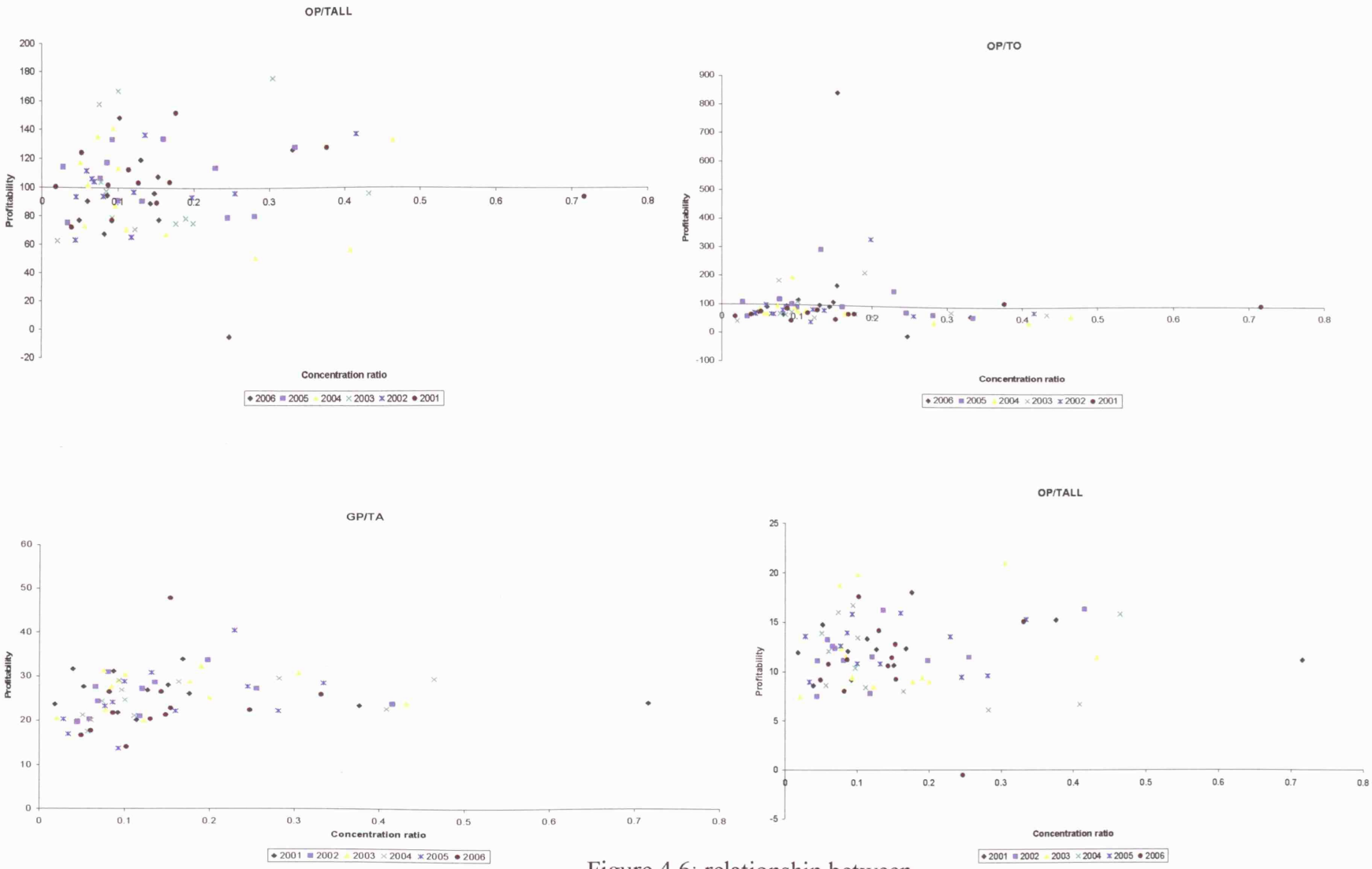


Figure 4.6: relationship between concentration ratio and profitability

It can be observed that there is a weak relationship between profitability and concentration ratio from figure 12. The sources of this figure have been tabulated in *appendix A*. There is a weak direct relationship between concentration ratio and profitability which means high difference of concentration ratio result in a smaller difference in level of profitability. This weak relationship seems weaker in case of profit margin. The level of profit margin is more or less the same for various concentration ratios. In case of the second graph, with a minor data complication which resulted in negative value, the relationship is stronger than last graph. The same situation applies to the first graph.

It is important to realise that sub-markets exists in markets. Therefore, there is a possibility that firms exercise power in some trades. It can be said that moderate overall concentration is average of low and high concentration in submarkets. High trade concentration results in high sub market activity with significant and unknown activities. Sub market is tricky to analyse as a result of regional tasks and project variation. There are no statistical data on profitability in sub market level. The closest we can get is trade statistics on regional work done.

Another point that can be extracted from graphs is that construction sector is not highly concentrated. Most of trade's concentration range is up to 40 percent (Table 6 and 7).

4.4 Concentration ratio and profitability over time

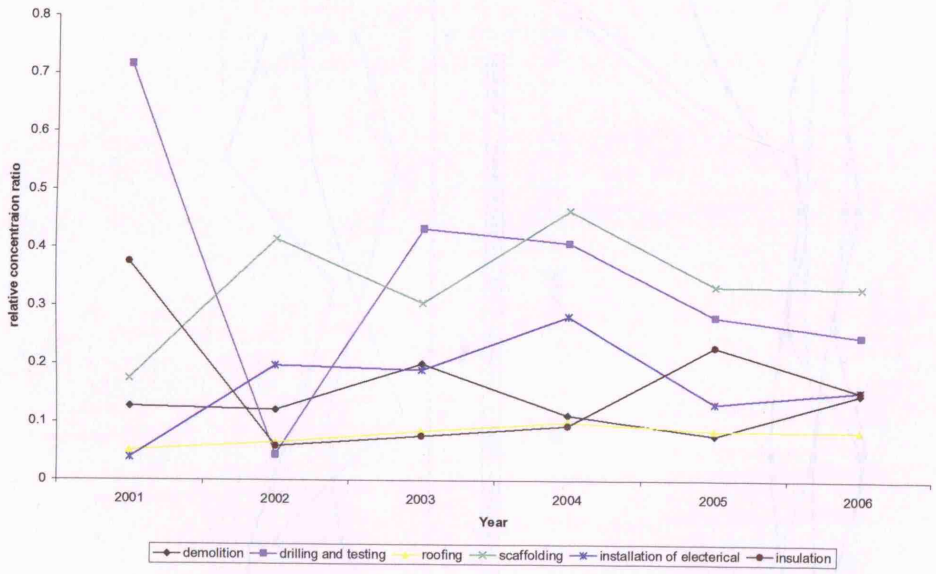
This section focuses on the relationship between relative profitability and concentration ratio of firms over time. The hypothesis suggests that both variables change in the same manner over time. This hypothesis can be tested by plotting two graphs. First graph represents change in relative concentration ratios over time and second graph signifies change in relative profitability over time. Afterwards, trends of graphs for each specialist trade are examined to discover existence of relationship (if any) between relative concentrations of trade over time with profitability changes over time. Every graph consists of six specialist trades and will be analysed with corresponding three diverse profitability ratios.

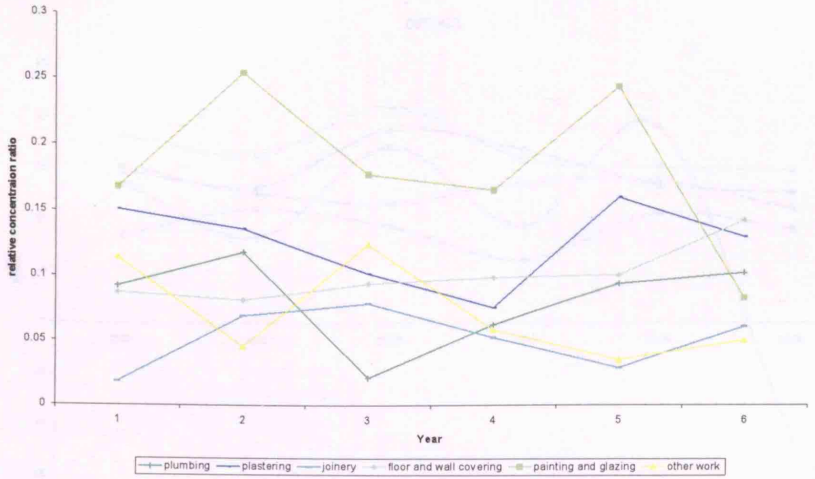
As it can be noticed from graph 14 on gross return profitability side, there is no clear upward or downward trend. This trend is shared in most of the specialist trades.

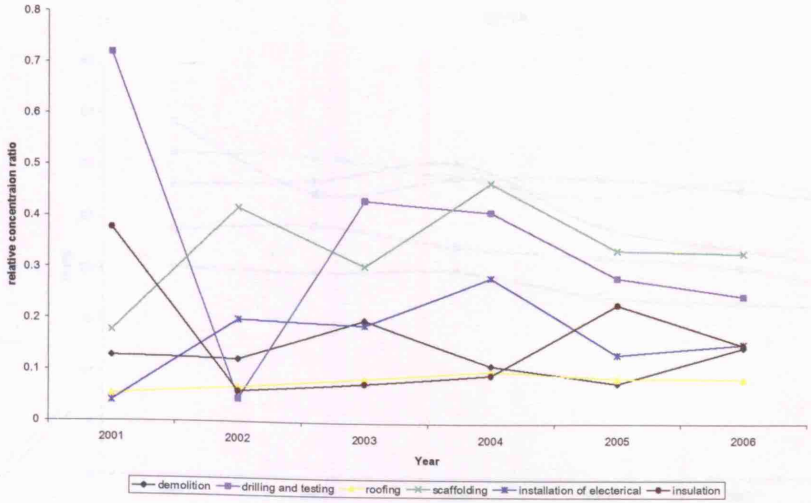
Generally, relative concentration ratio tends to oscillate frequently. Scattering points can be attributed to market condition, type of activity and number of firms participating in the market.

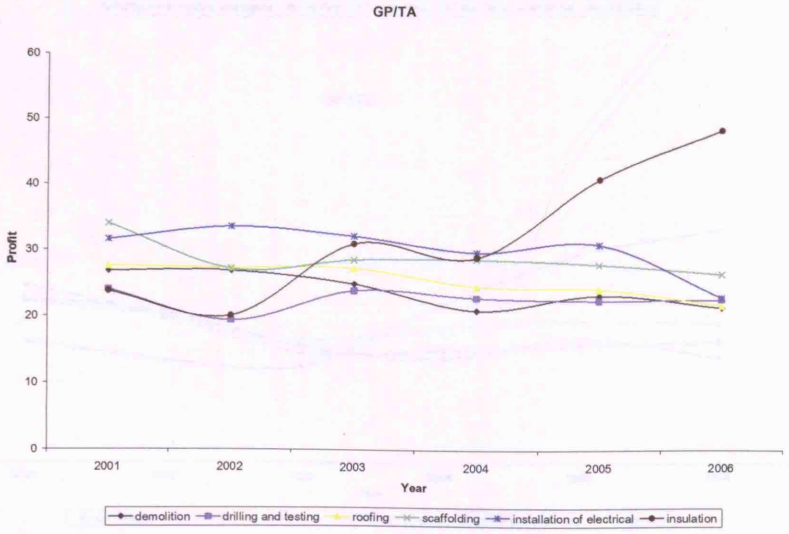
On the other hand, relative profitability values for various specialist trades have steadier trend in compare to relative concentration ratio. There is no need for further explanation here since profitability behaviour has been explained in section 4.2 profitability.

Therefore, the trend in relative concentration ratio has no clear trend. Most of the points are scattered. This behaviour is not followed exactly by relative profitability. As a result, it can be concluded that relative profitability of these specialist trades does not change over time in the same direction as changes in the relative concentration ratio.




relative concentraion ratio
0.3
0.25
0.2
0.15
0.1
0.05
0
1
2
3
4
5
6
Year
plumbing
plastering
joinery
floor and wall covering
painting and glazing
other work


relative concentraion ratio
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
2001
2002
2003
2004
2005
2006
Year
demolition
drilling and testing
roofing
scaffolding
installation of electerical
insulation


GP/TA
Profit
60
50
40
30
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10
0
2001
2002
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2004
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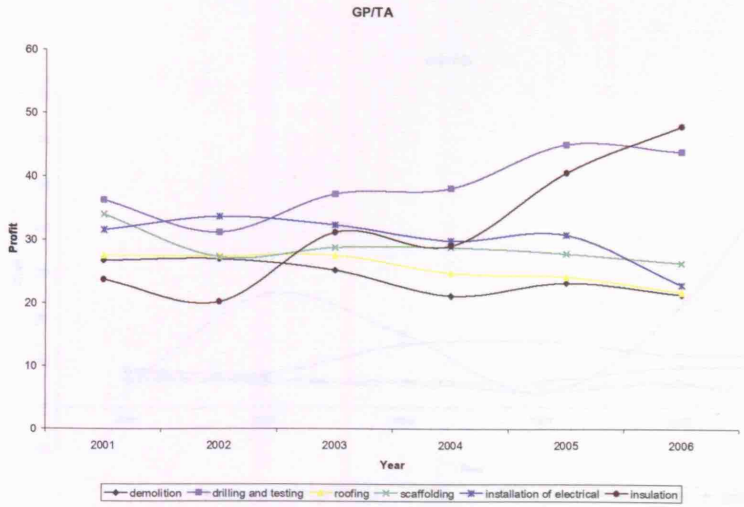
2006
Year
demolition
drilling and testing
roofing
scaffolding
installation of electrical
insulation


GP/TA
Profit
60
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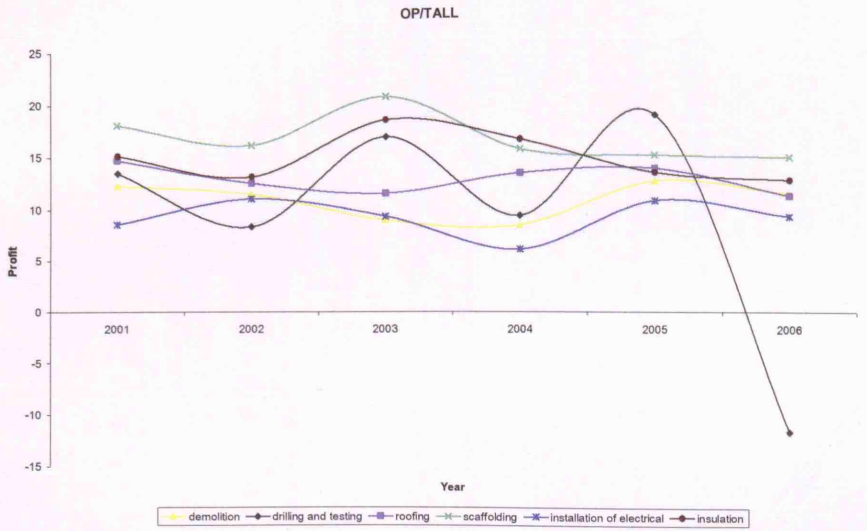
demolition
drilling and testing
roofing
scaffolding
installation of electrical
insulation


OP/TALL
Profit
Year
2001
2002
2003
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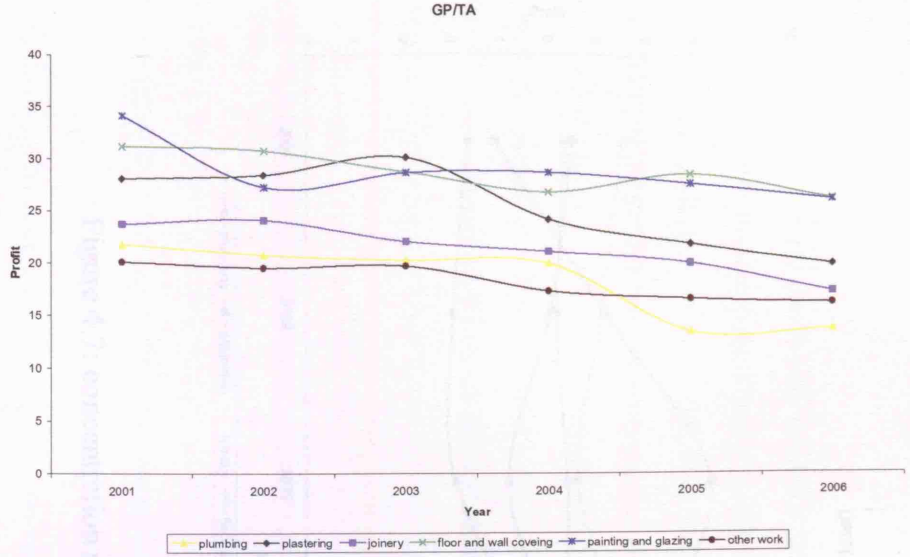
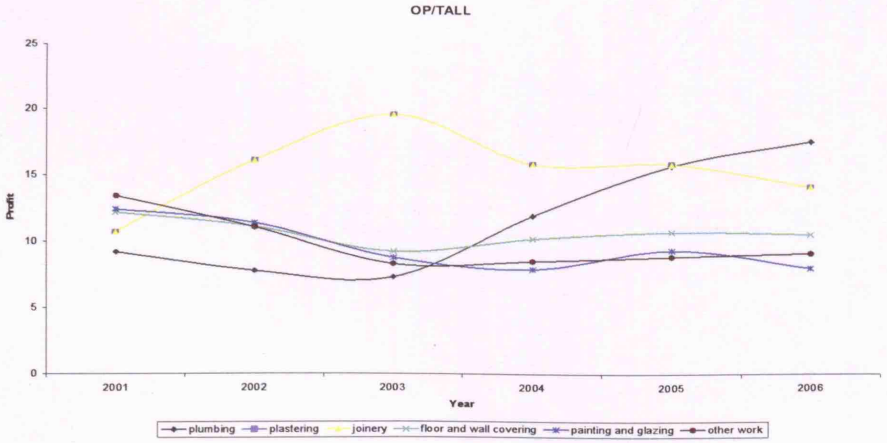
2005
2006
demolition
drilling and testing
roofing
scaffolding
installation of electrical
insulation


GP/TA
Profit
Year
2001
2002
2003
2004
2005
2006
plumbing
plastering
joinery
floor and wall coveing
painting and glazing
other work


OP/TALL
Profit
Year
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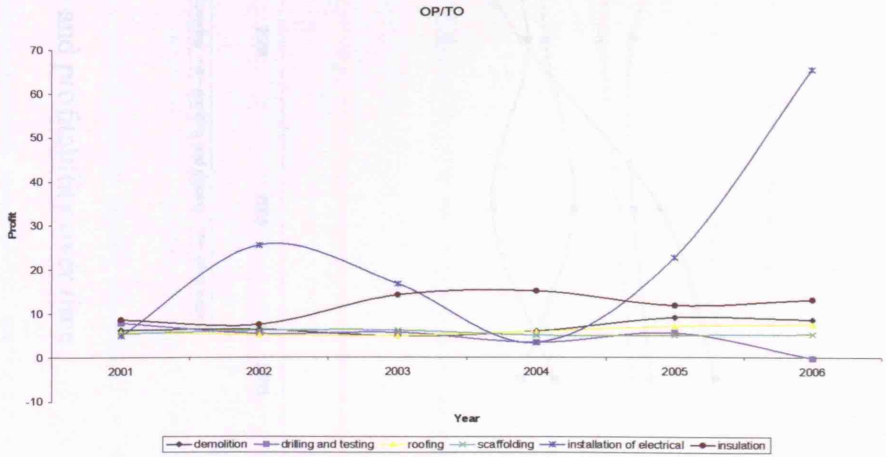
plumbing
plastering
joinery
floor and wall covering
painting and glazing
other work


OP/TO
Profit
Year
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roofing
scaffolding
installation of electrical
insulation

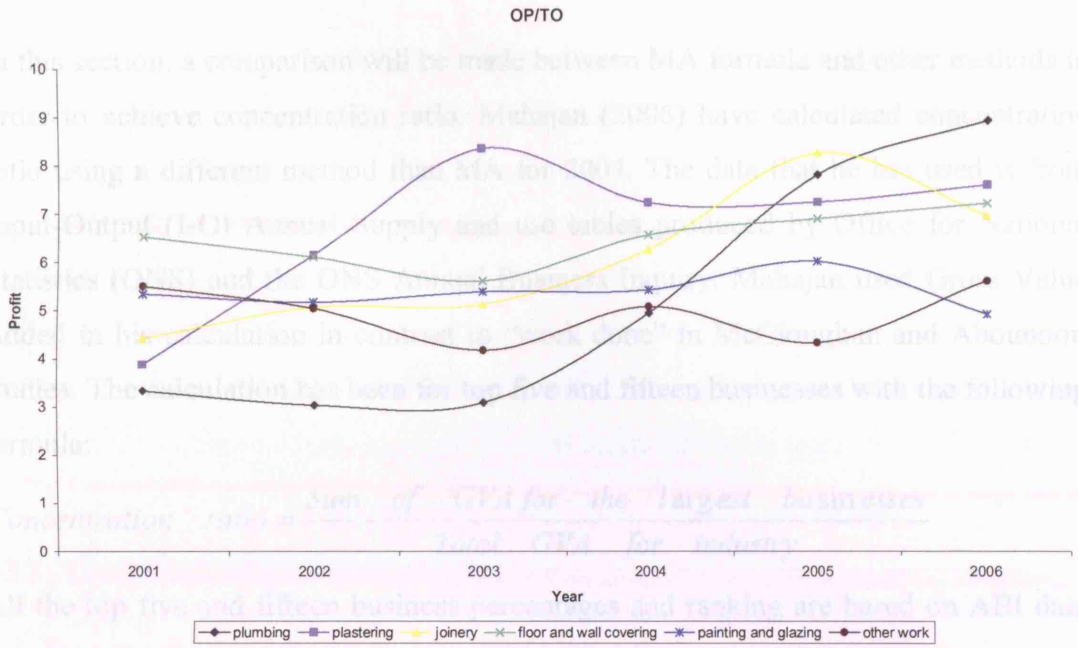

Figure 4.7: concentration ratio and profitability over time

4.5 Calculating Concentration ratio using other methods

In this section, a comparison will be made between MA formula and other methods in order to achieve concentration ratio. Mahajan (2006) have calculated concentration ratio using a different method than MA for 2004. The data that he has used is from Input-Output (I-O) Annual Supply and use tables produced by Office for National Statistics (ONS) and the ONS Annual Business Inquiry. Mahajan used Gross Value Added in his calculation in contrast to "work done" in McCloughan and Abounoori studies. The calculation has been for top five and fifteen businesses with the following formula:

$$Concentration \quad ratio = \frac{Sum \quad of \quad GVA \, for \quad the \quad l\arg est \quad bu\sin esses}{Total \quad GVA \quad for \quad industry}$$

All the top five and fifteen business percentages and ranking are based on ABI data for the UK. Construction sector is among the bottom ten industries in terms of contribution to GVA and total output at current basic prices made by the top five businesses. It is less than 10 percent. Mahajan argues construction consist of many small firms which sometimes are run by the self-employed which can contribute to the low GVA concentration ratio. Concentration ratio in all main trades of construction sector using MA formula for the top the firms is around 10 percent.

According to *Appendix C,* construction sector has the largest total output in the market of any industry thanks to the break down of manufacturing industry.

It is worth mentioning that Mahajan considers construction market as a monopolistic competition with characteristics of high number of participant firms, with open and unrestricted freedom of entry, heterogeneous nature of product and relatively elastic in price.

5. Conclusion and further research

In this paper, two hypotheses have been set and studied. The first hypothesis is that a high concentration ratio results in high profitability. The second hypothesis is that the relative profitability of any trade will change over time in the same direction as change in the relative concentration ratio. For testing the hypotheses, data have been gathered from DBERR and FAME data base. The gathered data covers period of 2001-6. The MA formula, which has been introduced by McCloughan and Abounoori (2003), has been used in order to estimate concentration ratio. Three profitability ratios have been studied: gross profit to total asset, operating profit to total asset less current liabilities and operating profit to turnover. The main conclusions of this study can be summarized as follows.

Studies in other industries demonstrate high correlation between concentration ratio and profitability. However, results reveal a weak relationship between concentration ratio and profitability in specialist trades in construction sector. It is worth mentioning that construction sector is a large market and level of concentration ratio tends to be small in large markets.

Regarding second hypothesis, no clear trends are observed. This in turn, indicates that relative profitability alters through time regardless of manner in which relative concentration ratio changes through time.

Results that were obtained for concentration ratio are as follows. There is volatility in the concentration ratio results. The volatility of concentration ratio in various years can result from three distinct causes. First is that top five firms change from year to year. Secondly, actual firm turnovers are volatile. Finally, some changes over in terms of mergers, acquisition and split ups. It is not feasible to find out the reason for volatility with data available for the current research. Therefore, the next step is to find the reason and analyse the result exploiting new data.

Taking to consideration that sample taken from FAME data base is relatively small, further research is needed on these hypotheses with different search criteria in order to

achieve bigger sample in order to have more reliable results. Moreover, data collected is not normally distributed which results in more careful analysis of obtained results. Moreover, in some collected data standard deviation of ratios are bigger than mean which indicate that we should be more cautious about the results.

Future work can be directed towards making use of various data in order to find out reasons for results that have been achieved in this market. This result could be affected as result of types of specialist trades which are capital or labour intensive. Another area of research interest is to study the effects of economy slow down or recession in the specialist trades in construction sector market. More research could be done in sub market area and firm's power in the sub-markets. Of course there are some constrains regarding data, however looking at the regional activities as well as using regional statistic recorded in the DBERR statistics could be a good starting point.

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7. Appendix

A. relationship between concentration ratio and profitability

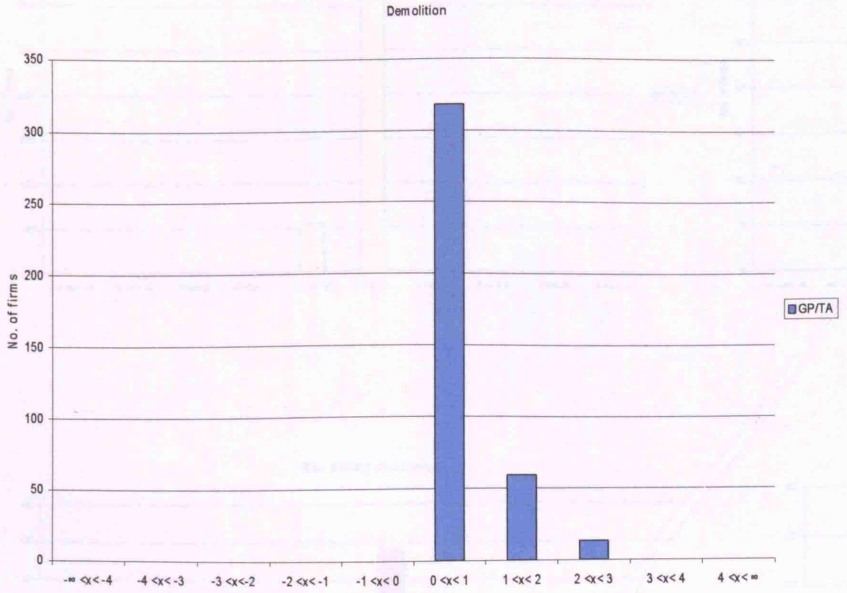
	2001	2002	2003	2004	2005	2006
Specialist trade	Point est.	Point est.	Point est.	Point est.	Point est.	Point est.
Demolition	0.127	0.121	0.2	0.112	0.077	0.148
Test drilling and boring	0.716	0.044	0.432	0.408	0.281	0.247
Roofing	0.052	0.066	0.085	0.101	0.086	0.086
Scaffolding	0.176	0.415	0.305	0.464	0.334	0.331
Installation of electrical	0.039	0.198	0.19	0.282	0.132	0.154
Insulation Activities	0.376	0.059	0.076	0.094	0.229	0.153
Plumbing	0.092	0.118	0.021	0.061	0.093	0.102
Plastering	0.151	0.136	0.101	0.074	0.16	0.13
Joinery Installation	0.018	0.069	0.078	0.051	0.028	0.06
Floor and wall covering	0.087	0.081	0.093	0.097	0.1	0.143
Painting and Glazing	0.168	0.255	0.177	0.164	0.245	0.082
Others work	0.114	0.045	0.123	0.057	0.034	0.049

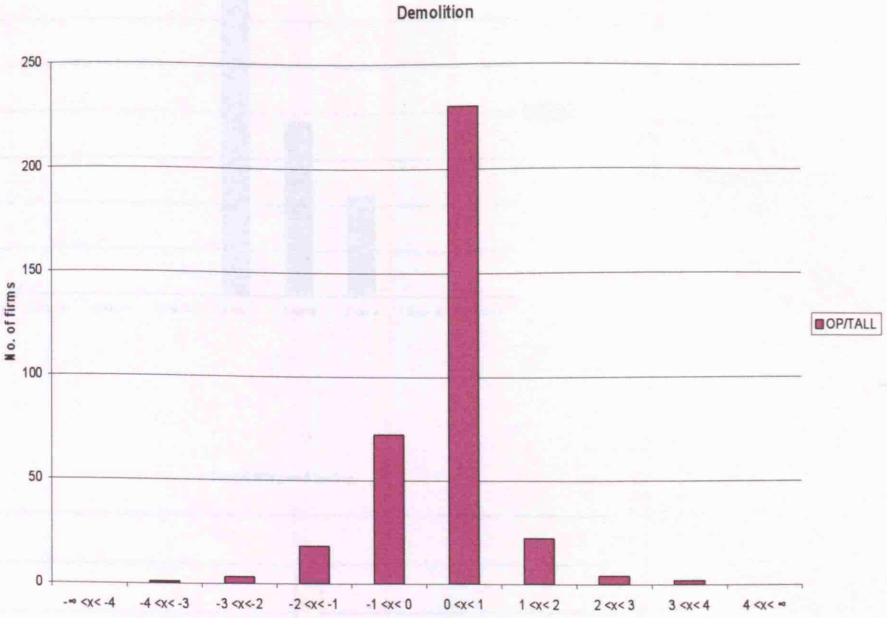
	2006	2005	2004	2003	2002	2001
Specialist trade	GP/TA	GP/TA	GP/TA	GP/TA	GP/TA	GP/TA
Demolition	21.37	23.30	21.14	25.24	27.21	26.89
Test drilling and boring	22.57	22.45	23.02	24.24	19.57	24.09
Roofing	21.75	24.17	24.68	27.59	27.61	27.62
Scaffolding	26.31	28.88	29.78	31.14	24.20	26.19
Installation of electrical	22.88	30.88	29.86	32.45	33.90	31.66
Insulation Activities	48.09	40.76	29.07	31.25	20.33	23.83
Plumbing	14.06	13.74	20.12	20.54	21.01	21.79
Plastering	20.37	22.20	24.37	30.38	28.68	28.08
Joinery Installation	17.69	20.34	21.28	22.36	24.34	23.71
Floor and wall covering	26.54	28.81	26.91	28.93	30.96	31.15
Painting & Glazing	26.43	27.90	28.83	28.88	27.50	34.10
Others work	16.66	16.95	17.52	20.04	19.80	20.15

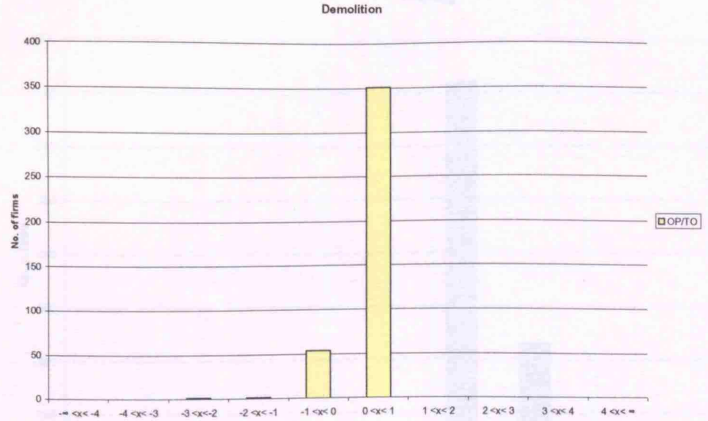
	2006	2005	2004	2003	2002	2001
Specialist trade	OP/TALL	OP/TALL	OP/TALL	OP/TALL	OP/TALL	OP/TALL
Demolition	11.47	12.68	8.43	8.95	11.56	12.33
Test drilling and boring	-0.53	9.54	6.68	11.39	7.51	11.17
Roofing	11.28	13.99	13.50	11.60	12.63	14.80
Scaffolding	15.08	15.28	15.82	21.06	16.37	18.14
Installation of electrical	9.25	10.82	6.06	9.35	11.12	8.60
Insulation Activities	12.84	13.57	16.79	18.78	13.29	15.24
Plumbing	17.68	15.88	12.12	7.44	7.79	9.18
Plastering	14.23	15.99	16.07	19.87	16.28	10.66
Joinery Installation	10.79	13.61	13.93	12.36	12.41	11.97
Floor and wall covering	10.62	10.85	10.39	9.42	11.17	12.14
Painting & Glazing	8.05	9.43	8.04	8.92	11.46	12.39
Others work	9.18	8.96	8.65	8.46	11.15	13.42

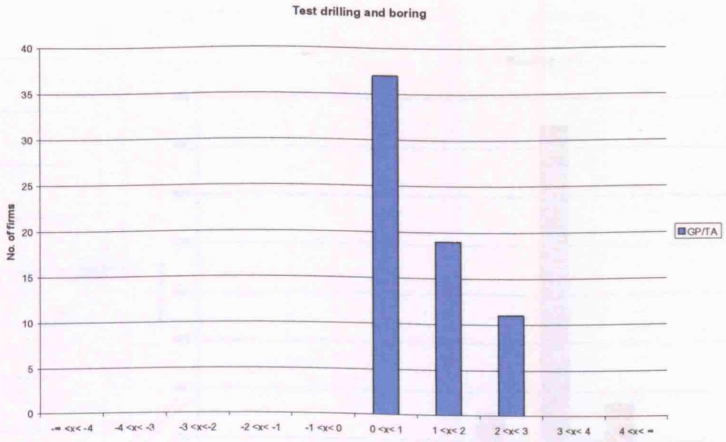
	2006	2005	2004	2003	2002	2001
Specialist trade	OP/TO	OP/TO	OP/TO	OP/TO	OP/TO	OP/TO
Demolition	8.46	8.98	5.96	4.82	6.33	6.31
Test drilling and boring	-0.29	5.43	3.31	5.60	5.41	7.85
Roofing	7.30	6.89	5.84	4.88	5.09	5.72
Scaffolding	5.11	4.85	4.97	6.10	6.12	5.37
Installation of electrical	64.51	22.42	3.33	16.50	25.45	4.91
Insulation Activities	12.92	11.63	14.95	14.02	7.48	8.65
Plumbing	8.91	7.79	4.94	3.09	3.04	3.34
Plastering	7.59	7.23	7.22	8.35	6.15	3.87
Joinery Installation	6.95	8.25	6.24	5.13	5.06	4.41
Floor and wall covering	7.20	6.89	6.55	5.61	6.11	6.53
Painting & Glazing	4.91	6.00	5.41	5.38	5.17	5.34
Others work	5.61	4.33	5.08	4.18	5.05	5.51

B. Data distribution

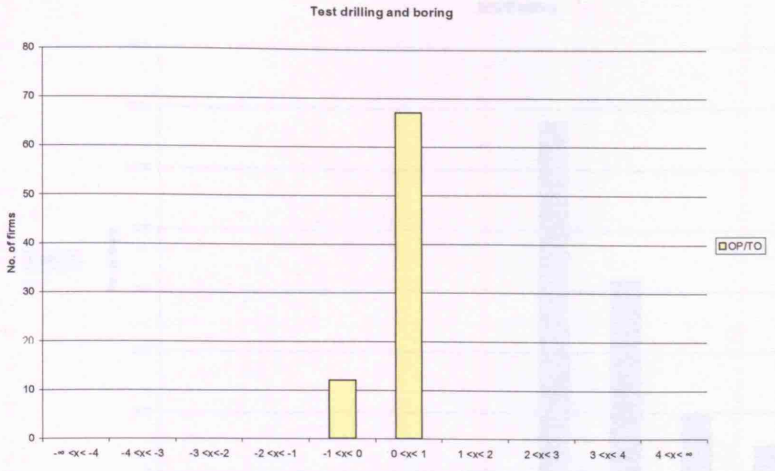


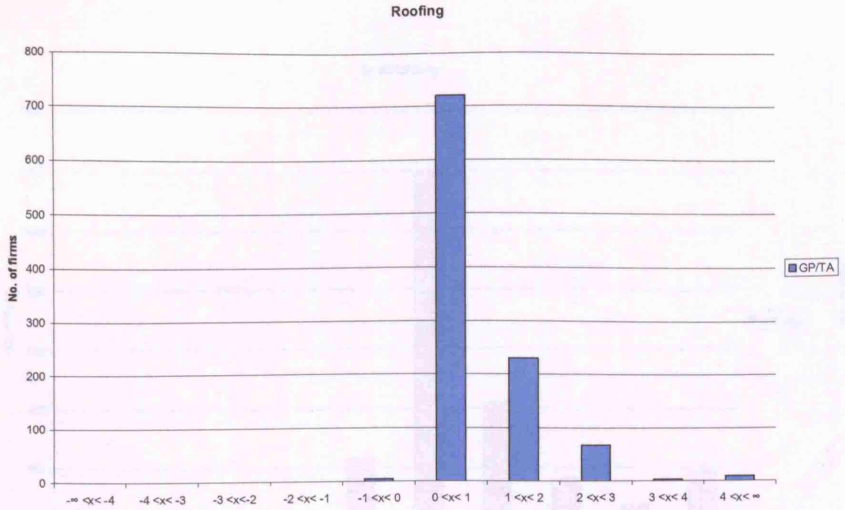


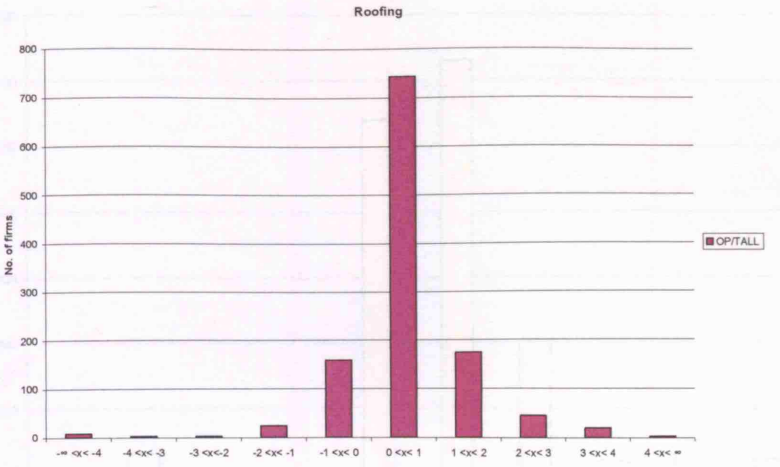

Demolition
No. of firms
400
350
300
250
200
150
100
50
0
-∞ <x< -4
-4 <x< -3
-3 <x<-2
-2 <x< -1
-1 <x< 0
0 <x< 1
1 <x< 2
2 <x< 3
3 <x< 4
4 <x< ∞
OP/TO

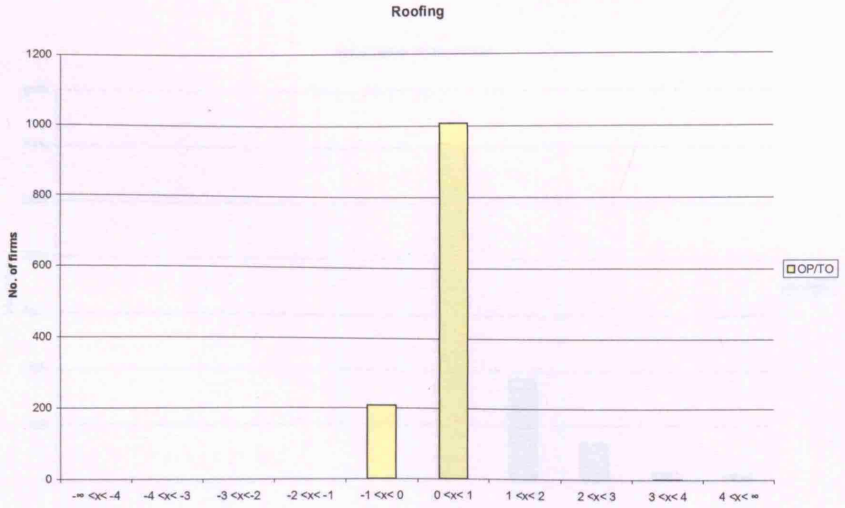

Test drilling and boring
No. of firms
40
35
30
25
20
15
10
5
0
-∞ <x< -4
-4 <x< -3
-3 <x<-2
-2 <x< -1
-1 <x< 0
0 <x< 1
1 <x< 2
2 <x< 3
3 <x< 4
4 <x< ∞
GP/TA

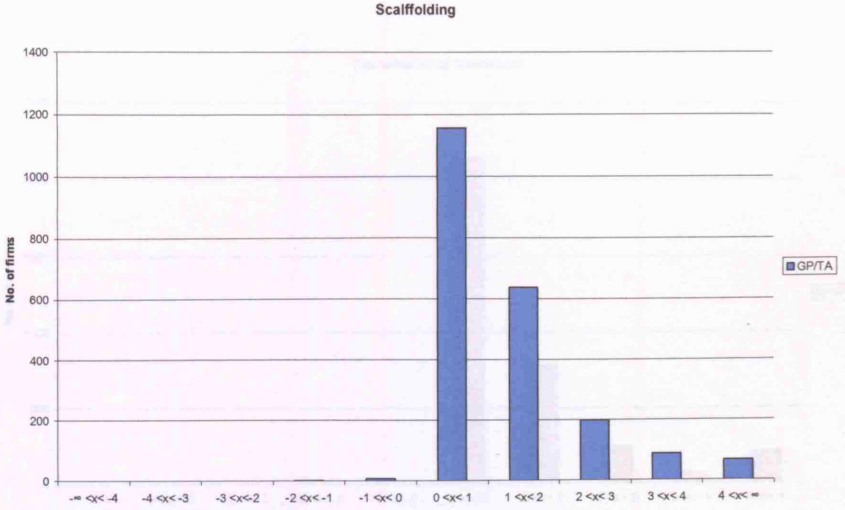

The drilling and boring
No. of firms
50
45
40
35
30
25
20
15
10
5
0
-∞ <x< -4
-4 <x< -3
-3 <x<-2
-2 <x< -1
-1 <x< 0
0 <x< 1
1 <x< 2
2 <x< 3
3 <x< 4
4 <x< ∞
OP/TALL

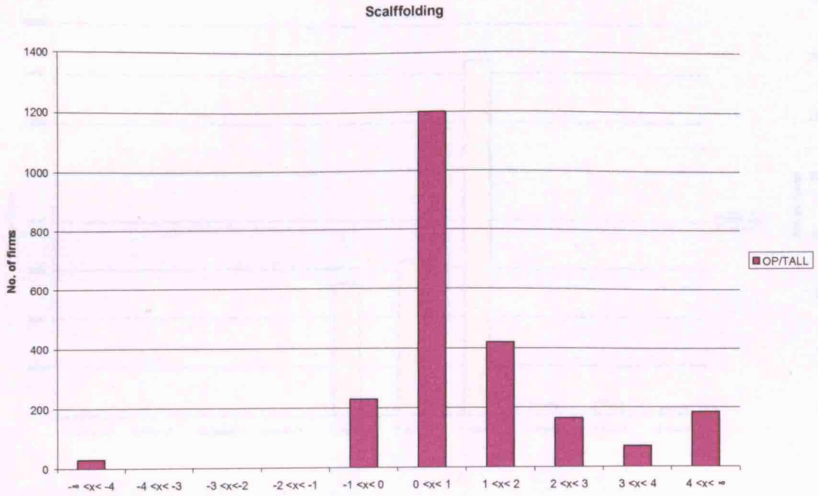

Test drilling and boring
No. of firms
80
70
60
50
40
30
20
10
0
-∞ <x< -4
-4 <x< -3
-3 <x<-2
-2 <x< -1
-1 <x< 0
0 <x< 1
1 <x< 2
2 <x< 3
3 <x< 4
4 <x< ∞
OP/TO

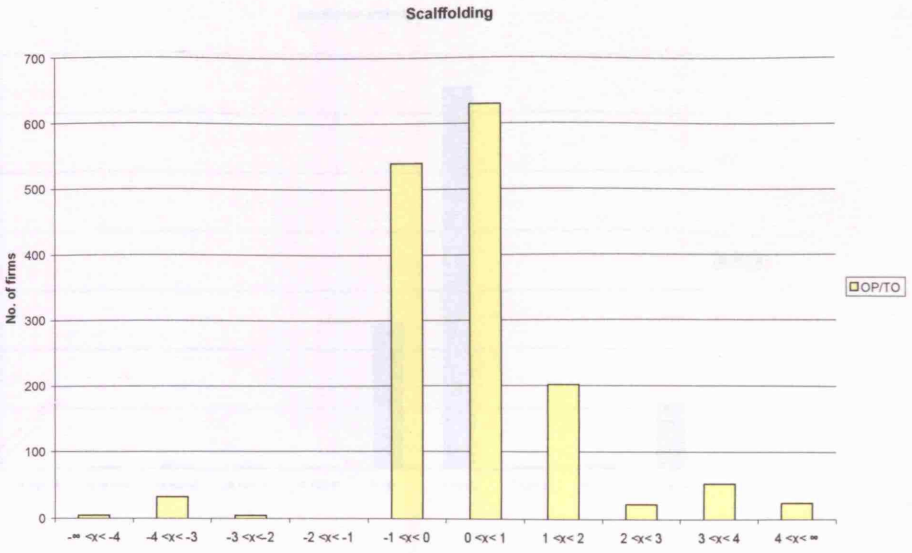

Roofing
No. of firms
800
700
600
500
400
300
200
100
0
-∞ <x< -4
-4 <x< -3
-3 <x<-2
-2 <x< -1
-1 <x< 0
0 <x< 1
1 <x< 2
2 <x< 3
3 <x< 4
4 <x< ∞
GP/TA

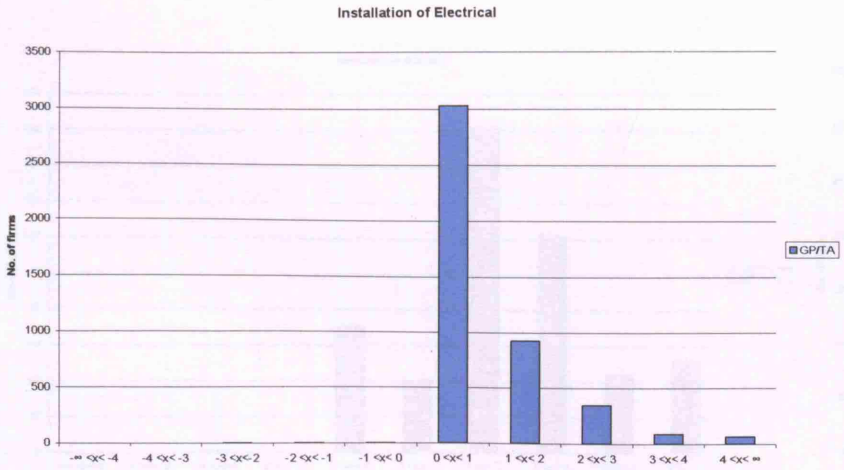

Roofing
No. of firms
800
700
600
500
400
300
200
100
0
-∞ <x< -4
-4 <x< -3
-3 <x<-2
-2 <x< -1
-1 <x< 0
0 <x< 1
1 <x< 2
2 <x< 3
3 <x< 4
4 <x< ∞
OP/TALL

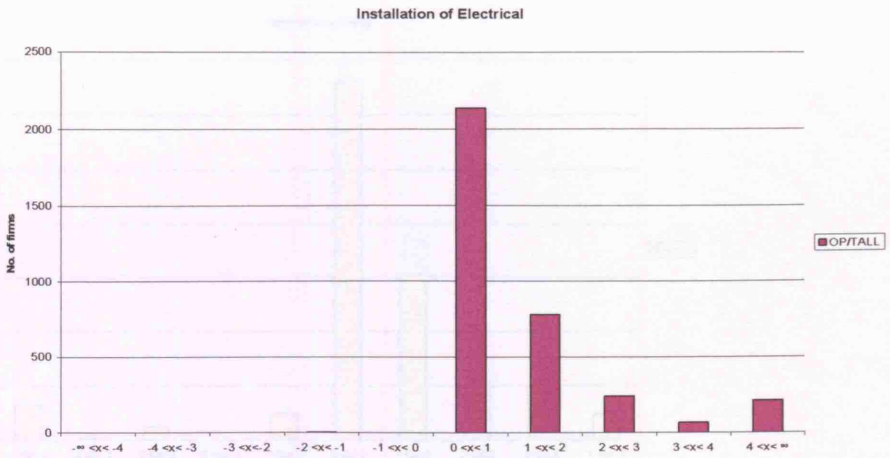

Roofing
No. of firms
1200
1000
800
600
400
200
0
-∞ <x< -4
-4 <x< -3
-3 <x<-2
-2 <x< -1
-1 <x< 0
0 <x< 1
1 <x< 2
2 <x< 3
3 <x< 4
4 <x< ∞
OP/TO

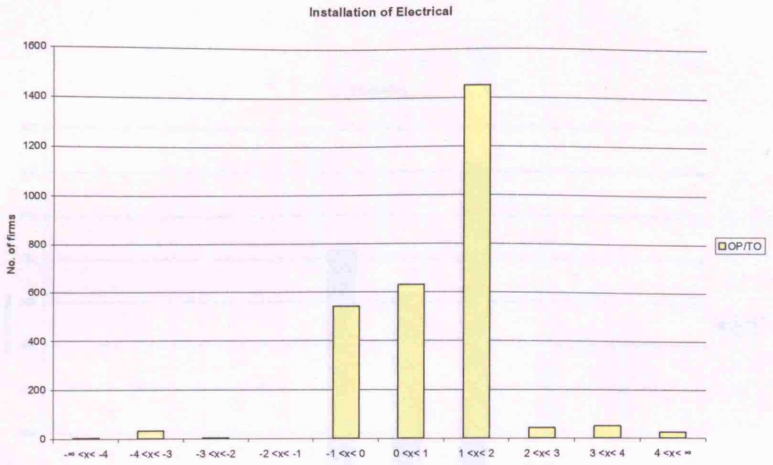

Scalffolding
No. of firms
1400
1200
1000
800
600
400
200
0
-∞ <x< -4
-4 <x< -3
-3 <x<-2
-2 <x< -1
-1 <x< 0
0 <x< 1
1 <x< 2
2 <x< 3
3 <x< 4
4 <x< ∞
GP/TA

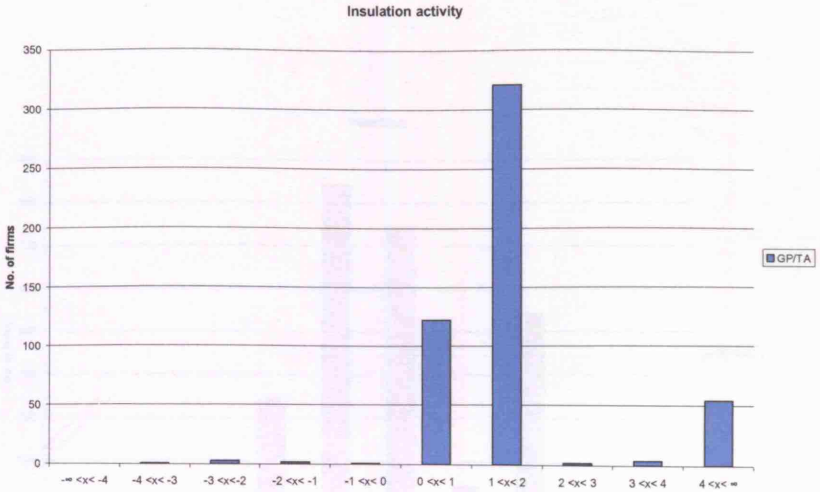

Scalffolding
No. of firms
1400
1200
1000
800
600
400
200
0
-∞ <x< -4
-4 <x< -3
-3 <x<-2
-2 <x< -1
-1 <x< 0
0 <x< 1
1 <x< 2
2 <x< 3
3 <x< 4
4 <x< ∞
OP/TALL

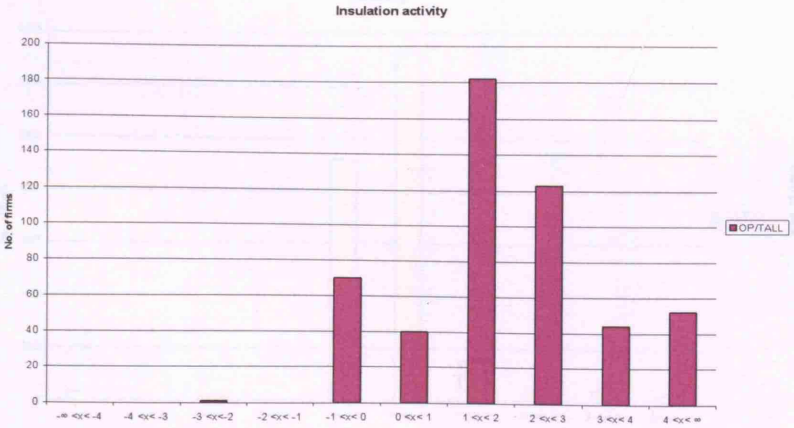

Scalffolding
No. of firms
700
600
500
400
300
200
100
0
-∞ <x< -4
-4 <x< -3
-3 <x<-2
-2 <x< -1
-1 <x< 0
0 <x< 1
1 <x< 2
2 <x< 3
3 <x< 4
4 <x< ∞
OP/TO

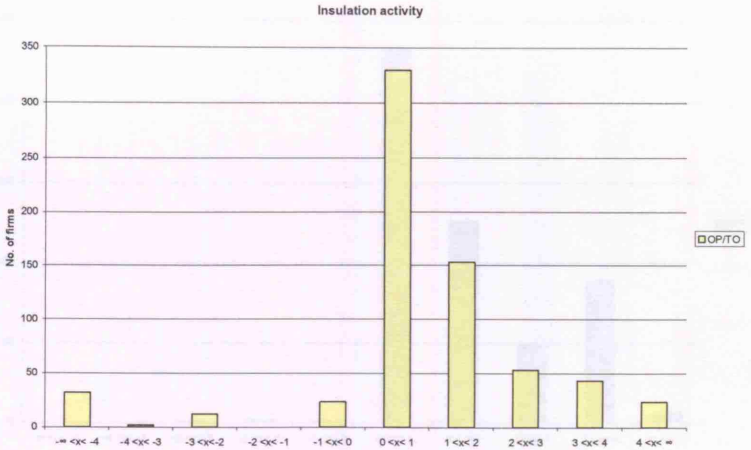

Installation of Electrical
No. of firms
3500
3000
2500
2000
1500
1000
500
0
-∞ <x< -4
-4 <x< -3
-3 <x<-2
-2 <x< -1
-1 <x< 0
0 <x< 1
1 <x< 2
2 <x< 3
3 <x< 4
4 <x< ∞
GP/TA

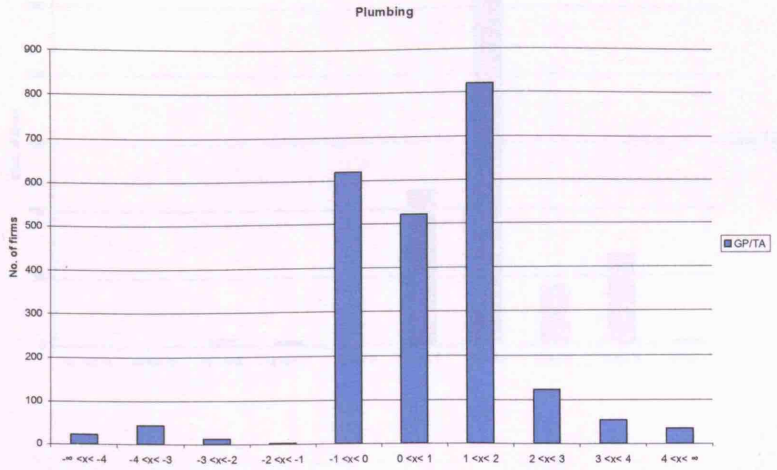

Installation of Electrical
No. of firms
2500
2000
1500
1000
500
0
-∞ <x< -4
-4 <x< -3
-3 <x<-2
-2 <x< -1
-1 <x< 0
0 <x< 1
1 <x< 2
2 <x< 3
3 <x< 4
4 <x< ∞
OP/TALL

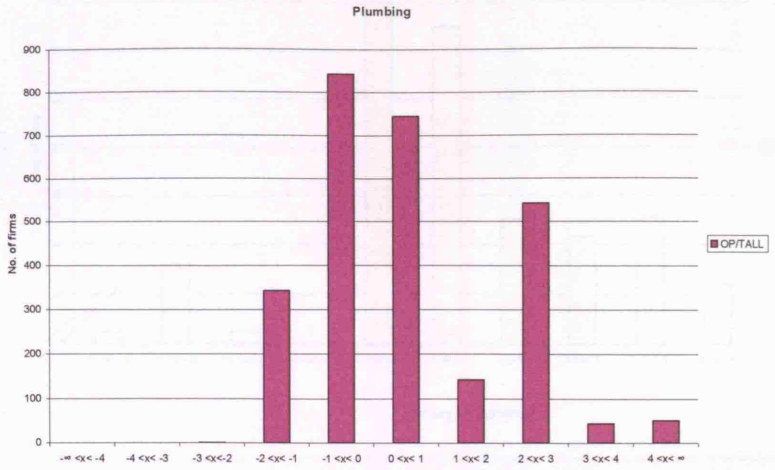

Installation of Electrical
No. of firms
1600
1400
1200
1000
800
600
400
200
0
-∞ <x< -4
-4 <x< -3
-3 <x<-2
-2 <x< -1
-1 <x< 0
0 <x< 1
1 <x< 2
2 <x< 3
3 <x< 4
4 <x< ∞
OP/TO

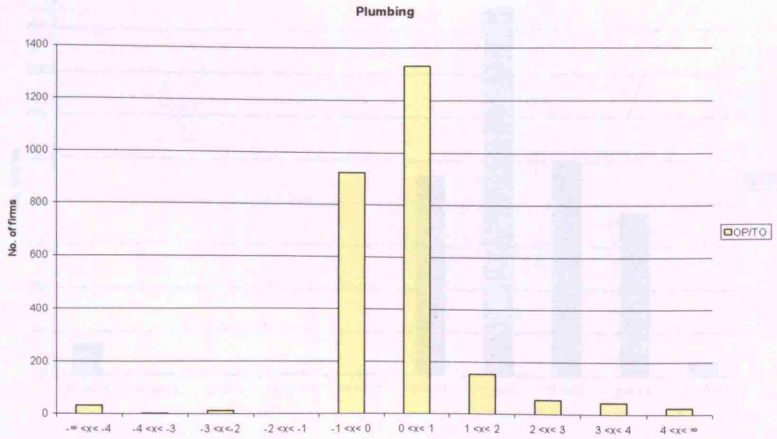

Insulation activity
No. of firms
350
300
250
200
150
100
50
0
-∞ <x< -4
-4 <x< -3
-3 <x<-2
-2 <x< -1
-1 <x< 0
0 <x< 1
1 <x< 2
2 <x< 3
3 <x< 4
4 <x< ∞
GP/TA

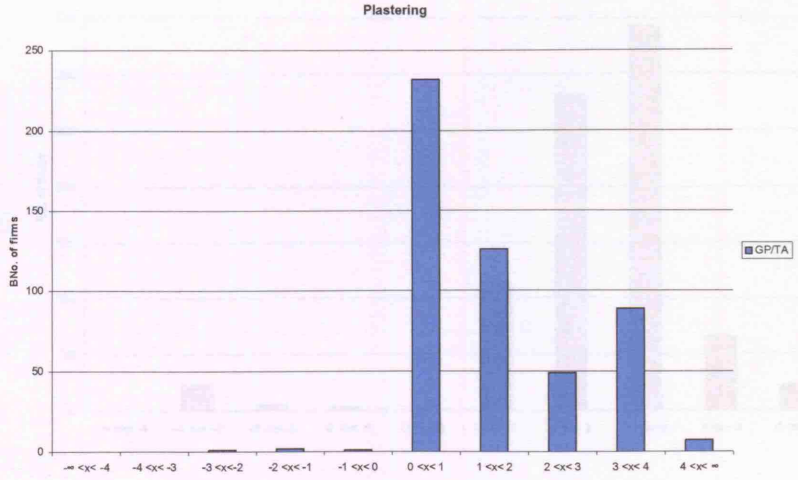

Insulation activity
No. of firms
200
180
160
140
120
100
80
60
40
20
0
-∞ <x< -4
-4 <x< -3
-3 <x<-2
-2 <x< -1
-1 <x< 0
0 <x< 1
1 <x< 2
2 <x< 3
3 <x< 4
4 <x< ∞
OP/TALL

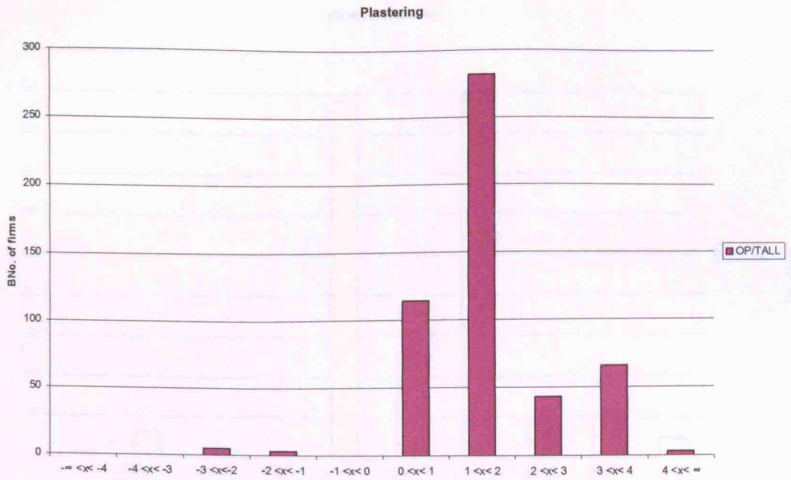

Insulation activity
No. of firms
350
300
250
200
150
100
50
0
-∞ <x< -4
-4 <x< -3
-3 <x<-2
-2 <x< -1
-1 <x< 0
0 <x< 1
1 <x< 2
2 <x< 3
3 <x< 4
4 <x< ∞
OP/TO

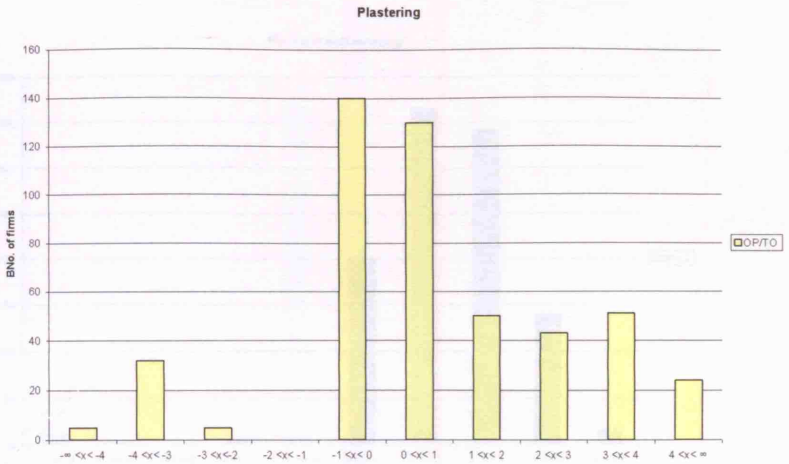

Plumbing
No. of firms
900
800
700
600
500
400
300
200
100
0
-∞ <x< -4
-4 <x< -3
-3 <x<-2
-2 <x< -1
-1 <x< 0
0 <x< 1
1 <x< 2
2 <x< 3
3 <x< 4
4 <x< ∞
GP/TA

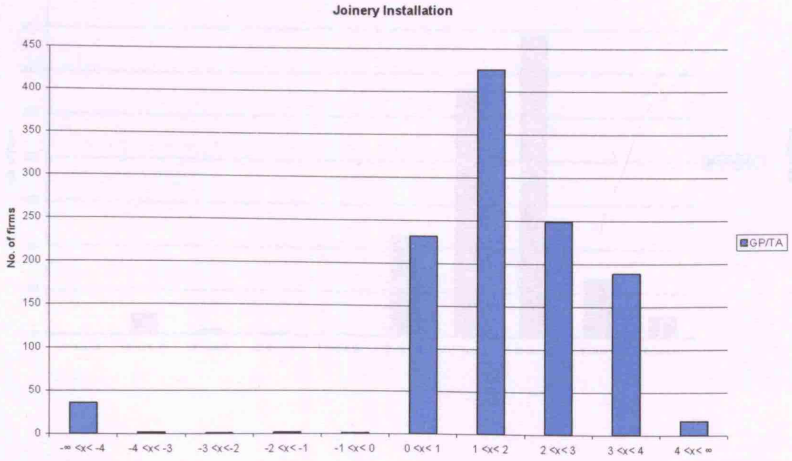

Plumbing
No. of firms
900
800
700
600
500
400
300
200
100
0
-∞ <x< -4
-4 <x< -3
-3 <x<-2
-2 <x< -1
-1 <x< 0
0 <x< 1
1 <x< 2
2 <x< 3
3 <x< 4
4 <x< ∞
OP/TALL


Plumbing
No. of firms
1400
1200
1000
800
600
400
200
0
-∞ <x< -4
-4 <x< -3
-3 <x<-2
-2 <x< -1
-1 <x< 0
0 <x< 1
1 <x< 2
2 <x< 3
3 <x< 4
4 <x< ∞
OP/TO

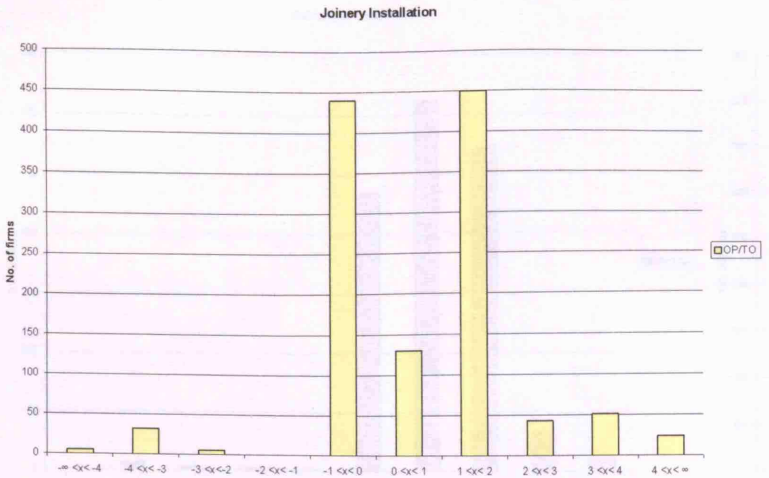

Plastering
BNo. of firms
250
200
150
100
50
0
-∞ <x< -4
-4 <x< -3
-3 <x<-2
-2 <x< -1
-1 <x< 0
0 <x< 1
1 <x< 2
2 <x< 3
3 <x< 4
4 <x< ∞
GP/TA


Plastering
BNo. of firms
300
250
200
150
100
50
0
-∞ <x< -4
-4 <x< -3
-3 <x<-2
-2 <x< -1
-1 <x< 0
0 <x< 1
1 <x< 2
2 <x< 3
3 <x< 4
4 <x< ∞
OP/TALL

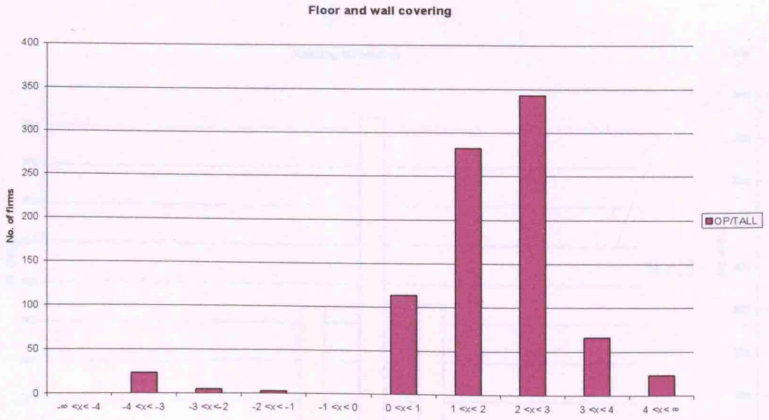

Plastering
BNo. of firms
160
140
120
100
80
60
40
20
0
-∞ <x< -4
-4 <x< -3
-3 <x<-2
-2 <x< -1
-1 <x< 0
0 <x< 1
1 <x< 2
2 <x< 3
3 <x< 4
4 <x< ∞
OP/TO

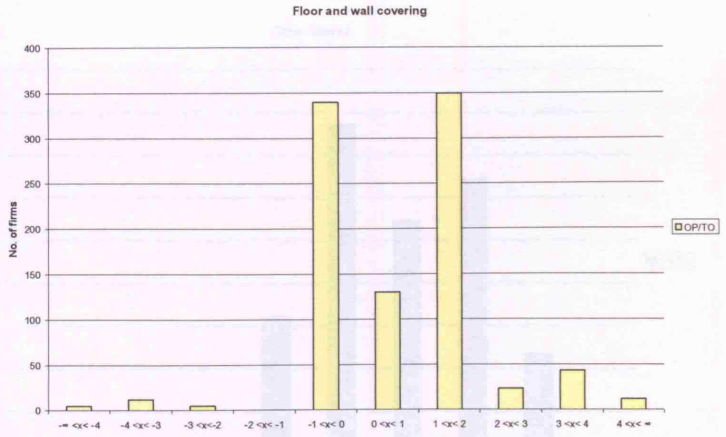

Joinery Installation
No. of firms
450
400
350
300
250
200
150
100
50
0
-∞ <x< -4
-4 <x< -3
-3 <x<-2
-2 <x< -1
-1 <x< 0
0 <x< 1
1 <x< 2
2 <x< 3
3 <x< 4
4 <x< ∞
GP/TA


Joinery Installation
No. of firms
400
350
300
250
200
150
100
50
0
-∞ <x< -4
-4 <x< -3
-3 <x<-2
-2 <x< -1
-1 <x< 0
0 <x< 1
1 <x< 2
2 <x< 3
3 <x< 4
4 <x< ∞
OP/TALL


Joinery Installation
No. of firms
500
450
400
350
300
250
200
150
100
50
0
OP/TO
-∞ <x< -4
-4 <x< -3
-3 <x<-2
-2 <x< -1
-1 <x< 0
0 <x< 1
1 <x< 2
2 <x< 3
3 <x< 4
4 <x< ∞


Floor and wall covering
No. of firms
400
350
300
250
200
150
100
50
0
GP/TA
-∞ <x< -4
-4 <x< -3
-3 <x<-2
-2 <x< -1
-1 <x< 0
0 <x< 1
1 <x< 2
2 <x< 3
3 <x< 4
4 <x< ∞


Floor and wall covering
No. of firms
400
350
300
250
200
150
100
50
0
OP/TALL
-∞ <x< -4
-4 <x< -3
-3 <x<-2
-2 <x< -1
-1 <x< 0
0 <x< 1
1 <x< 2
2 <x< 3
3 <x< 4
4 <x< ∞


Floor and wall covering
No. of firms
400
350
300
250
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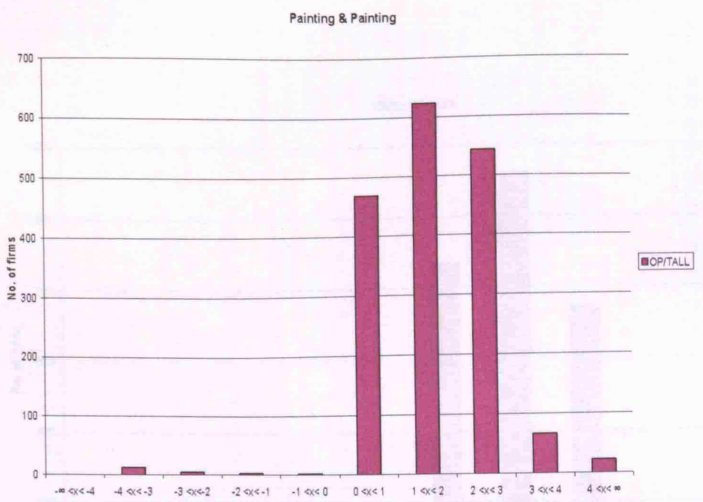
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No. of firms
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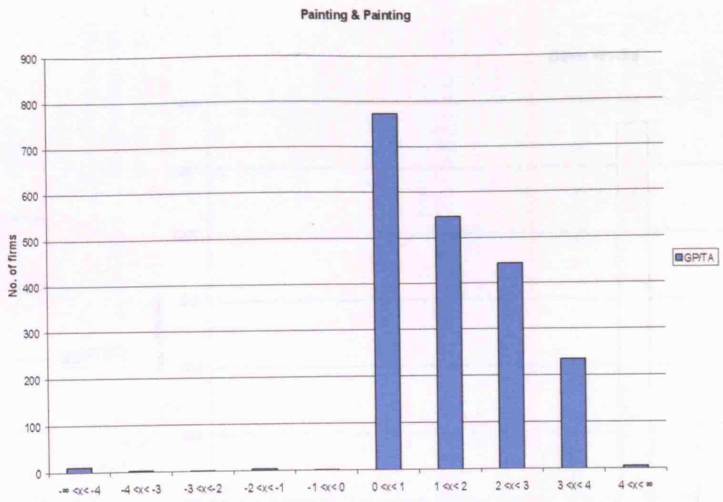
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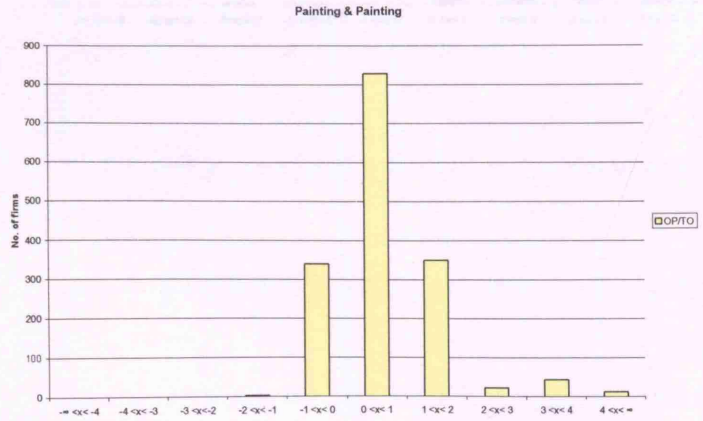
Painting & Painting
No. of firms
OP/TO
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-4 <x< -3
-3 <x<-2
-2 <x< -1
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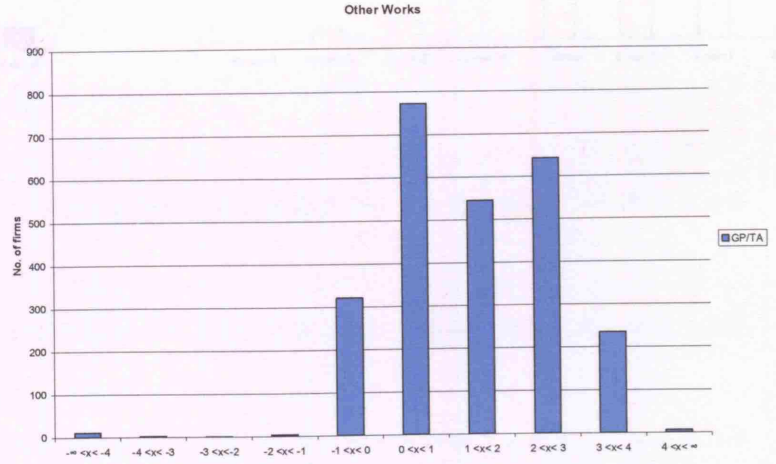
0 <x< 1
1 <x< 2
2 <x< 3
3 <x< 4
4 <x< ∞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No. of firms
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2 <x< 3
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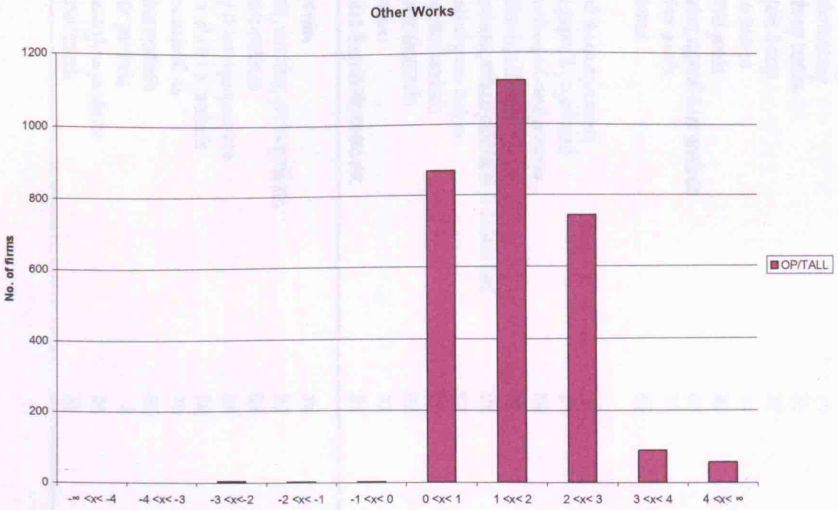
Other Works
No. of firms
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1000
800
600
400
200
0
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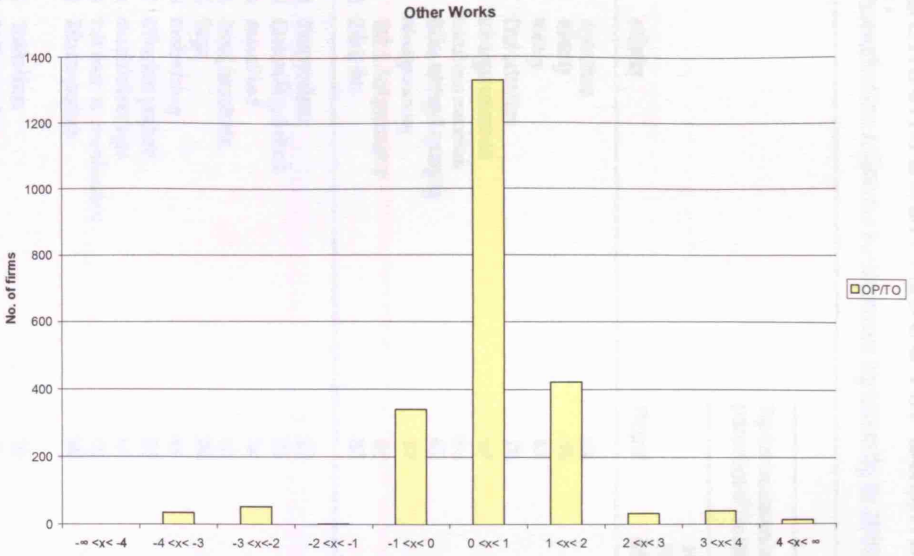
1 <x< 2
2 <x< 3
3 <x< 4
4 <x< ∞
OP/TALL


Other Works
No. of firms
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1200
1000
800
600
400
200
0
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0 <x< 1
1 <x< 2
2 <x< 3
3 <x< 4
4 <x< ∞
OP/TO

C. Concentration ratios for business industries

Concentration ratios for businesses by industry in 2004

		UK Annual Business Inquiry					
		Top five businesses as a percentage of the total		Top 15 businesses as a percentage of the total		Ranking positions for the top five businesses	
	Industry	Output	Gross Value Added	Output	Gross Value Added	Output	Gross Value Added
1	Agriculture	n/a	n/a	n/a	n/a	n/a	n/a
2	Forestry	48	39	51	43	29	45
3	Fishing	16	14	19	17	79	87
4	Coal extraction	79	71	92	87	7	11
5	Oil & gas extraction	57	59	82	84	22	22
6	Metal ore extraction	n/a	n/a	n/a	n/a	n/a	n/a
7	Other mining & quarrying	43	45	71	67	35	37
8	Meat processing	17	22	31	37	78	71
9	Fish & fruit processing	36	39	50	56	44	46
10	Oils & fats	88	84	95	96	3	6
11	Dairy products	32	37	57	64	50	47
12	Grain milling & starch	31	44	49	66	53	38
13	Animal feed	26	43	49	68	46	41
14	Bread, biscuits etc.	17	17	31	34	77	78
15	Sugar	99	100	99	100	1	2
16	Confectionery	81	88	91	94	5	8
17	Other food products	39	42	59	62	40	40
18	Alcoholic beverages	50	68	78	90	28	17
19	Soft drinks & mineral waters	75	76	93	90	10	8
20	Tobacco products	99	100	99	100	2	3
21	Textile fibres	29	34	56	65	55	51
22	Textile weaving	26	31	48	53	60	56
23	Textile finishing	14	11	31	22	83	99
24	Made-up textiles	17	17	32	32	75	82
25	Carpets & rugs	27	35	50	56	58	49
26	Other textiles	16	19	28	30	81	76
27	Knitted goods	32	30	43	44	49	57
28	Wearing apparel & fur products	14	10	25	18	87	100
29	Leather goods	30	27	48	40	54	67
30	Footwear	25	31	50	48	64	55
31	Wood & wood products	9	7	19	14	100	104
32	Pulp, paper & paperboard	21	24	51	52	69	69
33	Paper & paperboard products	34	21	42	31	47	72
34	Printing & publishing	12	12	21	22	93	92
35	Coke ovens, refined petroleum & nuclear fuel	66	67	97	94	15	18
36	Industrial gases & dyes	37	77	87	88	21	7
37	Inorganic chemicals	57	51	80	81	23	29
38	Organic chemicals	69	55	87	79	13	25
39	Fertilisers	72	70	97	96	11	14
40	Plastics & synthetic resins etc.	24	27	46	50	66	61
41	Pesticides	75	71	93	88	9	17
42	Paints, varnishes, printing ink etc.	37	42	52	56	41	42
43	Pharmaceuticals	57	63	74	81	24	20
44	Soap & toilet preparations	60	63	68	66	30	30
45	Other chemical products	18	28	39	49	74	59
46	Man-made fibres	79	89	97	98	6	5
47	Rubber products	45	40	60	57	32	43
48	Plastic products	4	5	10	11	111	110
49	Glass & glass products	28	28	49	52	59	60
50	Ceramic goods	31	33	51	56	52	53

Concentration ratios for businessess by industry in 2004

		UK Annual Business Inquiry					
		Top two businesses as a percentage of the total		Top 15 businesses as a percentage of the total		Ranking positions for the top five businesses	
	Industry	Output	Gross Value Added	Output	Gross Value Added	Output	Gross Value Added
51	Structural clay products	68	70	82	83	14	15
52	Cement, lime & plaster	71	74	94	93	12	10
53	Articles of concrete, stone etc.	25	24	43	43	65	70
54	Iron & steel	61	48	78	66	18	34
55	Non-ferrous metals	14	25	36	47	86	67
56	Metal castings	13	14	28	29	88	86
57	Structural metal products	6	6	12	11	105	105
58	Metal boilers & radiators	45	51	61	62	31	28
59	Metal forging, pressing etc.	4	3	7	7	110	111
60	Cutlery, tools etc.	11	10	19	18	95	98
61	Other metal products	14	11	25	21	84	97
62	Mechanical power equipment	29	26	41	40	56	66
63	General purpose machinery	8	9	20	18	103	102
64	Agricultural machinery	26	34	32	46	63	52
65	Machine tools	26	27	40	39	62	63
66	Special purpose machinery	20	15	34	26	71	84
67	Weapons & ammunition	77	70	95	93	8	13
68	Domestic appliances nec	44	51	66	67	34	30
69	Office machinery & computers	37	61	50	76	42	21
70	Electric motors & generators etc.	21	17	37	35	68	80
71	Insulated wire & cable	58	51	74	64	20	26
72	Electrical equipment nec	13	14	27	29	89	85
73	Electronic components	21	28	56	51	70	58
74	Transmitters for TV, radio & phone	51	48	69	66	27	32
75	Receivers for TV & radio	27	24	54	43	57	68
76	Medical & precision instruments	14	17	24	26	85	83
77	Motor vehicles	34	34	54	50	48	50
78	Shipbuilding & repair	43	48	68	68	36	33
79	Other transport equipment	50	46	74	71	19	35
80	Aircraft & spacecraft	44	56	75	77	33	24
81	Furniture	5	5	13	8	108	108
82	Jewellery & related products	16	13	25	19	80	90
83	Sports goods & toys	23	27	38	38	67	64
84	Miscellaneous manufacturing nec & recycling	26	20	30	25	61	74
85	Electricity production & distribution	55	64	86	91	26	19
86	Gas distribution	82	100	87	101	4	1
87	Water supply	55	57	92	92	25	23
88	Construction	5	5	9	9	106	109
89	Motor vehicle distribution & repair; automotive fuel retail	15	18	26	30	82	76
90	Wholesale distribution	6	10	11	14	104	99
91	Retail distribution	20	21	32	34	72	73
92	Hotels, catering, pubs etc.	13	13	21	23	92	88
93	Railway transport	41	50	88	95	37	31
94	Other land transport	13	18	28	26	90	77
95	Water transport	41	45	56	63	38	36
96	Air transport	n/a	n/a	n/a	n/a	n/a	n/a
97	Ancillary transport services	13	32	28	45	91	54
98	Postal & courier services	65	34	75	84	16	9
99	Telecommunications	61	69	75	82	17	16
100	Banking & finance	n/a	n/a	n/a	n/a	n/a	n/a

Concentration ratios for businesses by industry in 2004

	UK Annual Business Inquiry					
	Top five businesses as a percentage of the total		Top 15 businesses as a percentage of the total		Ranking positions for the top five businesses	
Industry	Output	Gross Value Added	Output	Gross Value Added	Output	Gross Value Added
101 Insurance & pension funds	n/a	n/a	n/a	n/a	n/a	n/a
102 Auxiliary financial services	n/a	n/a	n/a	n/a	n/a	n/a
103 Owning & dealing in real estate	n/a	n/a	n/a	n/a	n/a	n/a
104 Letting of dwellings	n/a	n/a	n/a	n/a	n/a	n/a
105 Estate agent activities	n/a	n/a	n/a	n/a	n/a	n/a
106 Renting of machinery etc.	10	13	22	26	98	89
107 Computer services	19	17	29	28	73	79
108 Research & development	37	51	51	70	43	27
109 Legal activities	9	9	17	17	101	101
110 Accountancy services	36	40	47	50	45	44
111 Market research, management consultancy	10	13	16	19	96	91
112 Architectural activities & technical consultancy	8	12	15	20	102	93
113 Advertising	10	12	21	20	97	94
114 Other business services	5	6	10	12	107	106
115 Public administration & defence	n/a	n/a	n/a	n/a	n/a	n/a
116 Education	10	8	15	14	99	103
117 Health & veterinary services	17	17	31	29	76	81
118 Social work activities	11	11	15	15	94	96
119 Sewage & sanitary services	31	36	66	73	51	48
120 Membership organisations	n/a	n/a	n/a	n/a	n/a	n/a
121 Recreational services	47	26	92	38	30	65
122 Other service activities	4	5	8	8	109	107
123 Private households with employed persons	n/a	n/a	n/a	n/a	n/a	n/a

Concentration ratios for businessess by Industry in 2004

UK I-O Supply and Use Tables — £ million

	Industry	All producers		Non-market producers						Market producers	
				Central government		Local government		NPISHs			
		Ouput	Gross Value Added	Output	Gross Value Added	Output	Gross Value Added	Output	Gross Value Added	Output	Gross Value Added
1	Agriculture	21 008	9 611	-	-	-	-	-	-	21 008	9 611
2	Forestry	859	323	-	-	-	-	-	-	859	323
3	Fishing	1 021	389	-	-	-	-	-	-	1 021	389
4	Coal extraction	916	385	-	-	-	-	-	-	916	385
5	Oil & gas extraction	26 626	19 845	-	-	-	-	-	-	26 626	19 845
6	Metal ores extraction	-	-	-	-	-	-	-	-	-	-
7	Other mining & quarrying	4 686	1 646	-	-	-	-	-	-	4 686	1 646
8	Meat processing	13 088	3 294	-	-	-	-	-	-	13 088	3 294
9	Fish & fruit processing	6 290	2 115	-	-	-	-	-	-	6 290	2 115
10	Oils & fats	1 171	235	-	-	-	-	-	-	1 171	235
11	Dairy products	5 890	1 266	-	-	-	-	-	-	5 890	1 266
12	Grain milling & starch	3 372	1 142	-	-	-	-	-	-	3 372	1 142
13	Animal feed	3 098	695	-	-	-	-	-	-	3 098	695
14	Bread, biscuits etc.	7 156	3 333	-	-	-	-	-	-	7 156	3 333
15	Sugar	1 351	376	-	-	-	-	-	-	1 351	376
16	Confectionery	4 254	2 271	-	-	-	-	-	-	4 254	2 271
17	Other food products	6 246	2 609	-	-	-	-	-	-	6 246	2 609
18	Alcoholic beverages	6 841	2 780	-	-	-	-	-	-	6 841	2 780
19	Soft drinks & mineral waters	3 451	1 032	-	-	-	-	-	-	3 451	1 032
20	Tobacco products	2 096	1 140	-	-	-	-	-	-	2 096	1 140
21	Textile fibres	501	185	-	-	-	-	-	-	501	185
22	Textile weaving	852	318	-	-	-	-	-	-	852	318
23	Textile finishing	584	267	-	-	-	-	-	-	584	267
24	Made-up textiles	1 743	695	-	-	-	-	-	-	1 743	695
25	Carpets & rugs	779	283	-	-	-	-	-	-	779	283
26	Other textiles	1 120	441	-	-	-	-	-	-	1 120	441
27	Knitted goods	775	326	-	-	-	-	-	-	775	326
28	Wearing apparel & fur products	3 674	1 308	-	-	-	-	-	-	3 674	1 308
29	Leather goods	472	184	-	-	-	-	-	-	472	184
30	Footwear	325	163	-	-	-	-	-	-	325	163
31	Wood & wood products	7 050	2 904	-	-	-	-	-	-	7 050	2 904
32	Pulp, paper & paperboard	2 969	918	-	-	-	-	-	-	2 969	918
33	Paper & paperboard products	8 818	2 765	-	-	-	-	-	-	8 818	2 765
34	Printing & publishing	33 673	16 475	-	-	-	-	-	-	33 673	16 475
35	Coke ovens, refined petroleum & nuclear fuel	18 344	2 420	-	-	-	-	-	-	18 344	2 420
36	Industrial gases & dyes	2 499	928	-	-	-	-	-	-	2 499	928
37	Inorganic chemicals	1 564	421	-	-	-	-	-	-	1 564	421
38	Organic chemicals	7 586	1 665	-	-	-	-	-	-	7 586	1 665
39	Fertilisers	912	174	-	-	-	-	-	-	912	174
40	Plastics & synthetic resins etc.	4 636	1 146	-	-	-	-	-	-	4 636	1 146
41	Pesticides	1 035	400	-	-	-	-	-	-	1 035	400
42	Paints, varnishes, printing ink etc.	3 101	1 124	-	-	-	-	-	-	3 101	1 124
43	Pharmaceuticals	14 753	6 522	-	-	-	-	-	-	14 753	6 522
44	Soap & toilet preparations	5 407	1 970	-	-	-	-	-	-	5 407	1 970
45	Other chemical products	4 598	1 693	-	-	-	-	-	-	4 598	1 693
46	Man-made fibres	499	190	-	-	-	-	-	-	499	190
47	Rubber products	3 224	1 407	-	-	-	-	-	-	3 224	1 407
48	Plastic products	16 529	6 417	-	-	-	-	-	-	16 529	6 417
49	Glass & glass products	2 947	1 316	-	-	-	-	-	-	2 947	1 316
50	Ceramic goods	1 553	807	-	-	-	-	-	-	1 553	807

Concentration ratios for businessess by industry in 2004

UK I-O Supply and Use Tables — £ million

	Industry	All producers		Non-market producers						Market producers	
				Central government		Local government		NPISHs			
		Ouput	Gross Value Added	Output	Gross Value Added	Output	Gross Value Added	Output	Gross Value Added	Output	Gross Value Added
51	Structural clay products	745	405	-	-	-	-	-	-	745	405
52	Cement, lime & plaster	1 016	462	-	-	-	-	-	-	1 016	462
53	Articles of concrete, stone etc.	6 559	2 696	-	-	-	-	-	-	6 559	2 696
54	Iron & steel	8 411	1 445	-	-	-	-	-	-	8 411	1 445
55	Non-ferrous metals	4 442	1 046	-	-	-	-	-	-	4 442	1 046
56	Metal castings	1 535	678	-	-	-	-	-	-	1 535	678
57	Structural metal products	6 998	2 683	-	-	-	-	-	-	6 998	2 683
58	Metal boilers & radiators	1 769	746	-	-	-	-	-	-	1 769	746
59	Metal forging, pressing etc.	9 334	4 881	-	-	-	-	-	-	9 334	4 881
60	Cutlery, tools etc.	2 143	1 207	-	-	-	-	-	-	2 143	1 207
61	Other metal products	5 615	2 411	-	-	-	-	-	-	5 615	2 411
62	Mechanical power equipment	6 829	2 715	-	-	-	-	-	-	6 829	2 715
63	General purpose machinery	9 958	4 181	-	-	-	-	-	-	9 958	4 181
64	Agricultural machinery	1 572	390	-	-	-	-	-	-	1 572	390
65	Machine tools	1 256	650	-	-	-	-	-	-	1 256	650
66	Special purpose machinery	6 340	2 460	-	-	-	-	-	-	6 340	2 460
67	Weapons & ammunition	2 259	712	-	-	-	-	-	-	2 259	712
68	Domestic appliances nec	2 753	1 091	-	-	-	-	-	-	2 753	1 091
69	Office machinery & computers	7 412	2 074	-	-	-	-	-	-	7 412	2 074
70	Electric motors & generators etc.	6 020	2 297	-	-	-	-	-	-	6 020	2 297
71	Insulated wire & cable	1 103	408	-	-	-	-	-	-	1 103	408
72	Electrical equipment nec	5 270	2 029	-	-	-	-	-	-	5 270	2 029
73	Electronic components	3 734	1 302	-	-	-	-	-	-	3 734	1 302
74	Transmitters for TV, radio & phone	3 788	1 145	-	-	-	-	-	-	3 788	1 145
75	Receivers for TV & radio	2 843	880	-	-	-	-	-	-	2 843	880
76	Medical & precision instruments	11 461	5 490	-	-	-	-	-	-	11 461	5 490
77	Motor vehicles	37 931	8 830	-	-	-	-	-	-	37 931	8 830
78	Shipbuilding & repair	2 828	1 193	-	-	-	-	-	-	2 828	1 193
79	Other transport equipment	2 595	703	-	-	-	-	-	-	2 595	703
80	Aircraft & spacecraft	14 500	5 591	-	-	-	-	-	-	14 500	5 591
81	Furniture	9 005	3 606	-	-	-	-	-	-	9 005	3 606
82	Jewellery & related products	856	356	-	-	-	-	-	-	856	356
83	Sports goods & toys	1 054	433	-	-	-	-	-	-	1 054	433
84	Miscellaneous manufacturing nec & recycling	6 045	2 152	-	-	-	-	-	-	6 045	2 152
85	Electricity production & distribution	33 361	10 061	-	-	-	-	-	-	33 361	10 061
86	Gas distribution	12 979	3 886	-	-	-	-	-	-	12 979	3 886
87	Water supply	4 534	3 156	-	-	-	-	-	-	4 534	3 156
88	Construction	170 265	64 747	-	-	-	-	-	-	170 265	64 747
89	Motor vehicle distribution & repair; automotive fuel retail	42 875	21 834	-	-	-	-	-	-	42 875	21 834
90	Wholesale distribution	99 600	45 903	-	-	-	-	-	-	99 600	45 903
91	Retail distribution	98 244	59 783	-	-	-	-	-	-	98 244	59 783
92	Hotels, catering, pubs etc.	70 038	33 074	-	-	-	-	-	-	70 038	33 074
93	Railway transport	7 597	2 321	-	-	-	-	-	-	7 597	2 321
94	Other land transport	36 152	19 005	-	-	-	-	-	-	36 152	19 005
95	Water transport	8 820	3 399	-	-	-	-	-	-	8 820	3 399
96	Air transport	14 668	6 089	-	-	-	-	-	-	14 668	6 089
97	Ancillary transport services	47 790	18 703	-	-	-	-	-	-	47 790	18 703
98	Postal & courier services	14 559	8 466	-	-	-	-	-	-	14 559	8 466
99	Telecommunications	39 309	21 296	-	-	-	-	-	-	39 309	21 296
100	Banking & finance	87 954	61 033	-	-	-	-	-	-	87 954	61 033

Concentration ratios for businesses by industry in 2004

UK I-O Supply and Use Tables — £ million

Industry	All producers		Non-market producers						Market producers	
			Central government		Local government		NPISHs			
	Output	Gross Value Added	Output	Gross Value Added	Output	Gross Value Added	Output	Gross Value Added	Output	Gross Value Added
101 Insurance & pension funds	54 542	14 298	-	-	-	-	163	86	54 379	14 212
102 Auxiliary financial services	21 389	10 813	-	-	-	-	-	-	21 389	10 813
103 Owning & dealing in real estate	29 398	22 022	-	-	-	-	-	-	29 398	22 022
104 Letting of dwellings	95 578	83 037	-	-	-	-	-	-	95 578	83 037
105 Estate agent activities	7 289	5 209	-	-	-	-	-	-	7 289	5 209
106 Renting of machinery etc.	19 157	11 094	-	-	-	-	-	-	19 157	11 094
107 Computer services	52 118	30 625	-	-	-	-	-	-	52 118	30 625
108 Research & development	7 241	4 174	-	-	-	-	614	419	6 627	3 755
109 Legal activities	22 573	14 928	-	-	-	-	-	-	22 573	14 928
110 Accountancy services	14 158	10 303	-	-	-	-	-	-	14 158	10 303
111 Market research, management consultancy	23 743	12 677	-	-	-	-	-	-	23 743	12 677
112 Architectural activities & technical consultancy	32 324	19 261	-	-	-	-	-	-	32 324	19 261
113 Advertising	9 816	5 797	-	-	-	-	-	-	9 816	5 797
114 Other business services	69 099	38 343	-	-	-	-	725	431	68 374	37 912
115 Public administration & defence	111 294	55 280	73 514	31 562	37 780	23 718	-	-	-	-
116 Education	85 573	61 786	1 266	834	43 243	31 074	21 411	17 507	19 153	12 371
117 Health & veterinary services	97 042	57 350	77 593	42 921	-	-	2 283	1 045	17 166	13 384
118 Social work activities	42 824	18 467	1 077	471	24 435	7 468	4 195	2 278	13 117	8 250
119 Sewage & sanitary services	14 620	7 227	-	-	5 621	1 330	-	-	8 999	5 897
120 Membership organisations	8 768	6 276	-	-	-	-	4 260	3 206	4 508	3 070
121 Recreational services	58 371	30 486	3 281	1 090	5 160	1 990	3 551	1 113	46 379	26 293
122 Other service activities	13 182	6 486	-	-	-	-	282	132	12 900	6 354
123 Private households with employed persons	5 068	5 068	-	-	-	-	-	-	5 068	5 068
Total	2 151 833	1 094 330	156 731	76 878	116 739	65 580	37 484	26 217	1 840 879	925 655
FISIM	-	-50 165	-	-	-	-	-	-	-	
Total (including FISIM)		1 044 165								